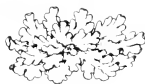






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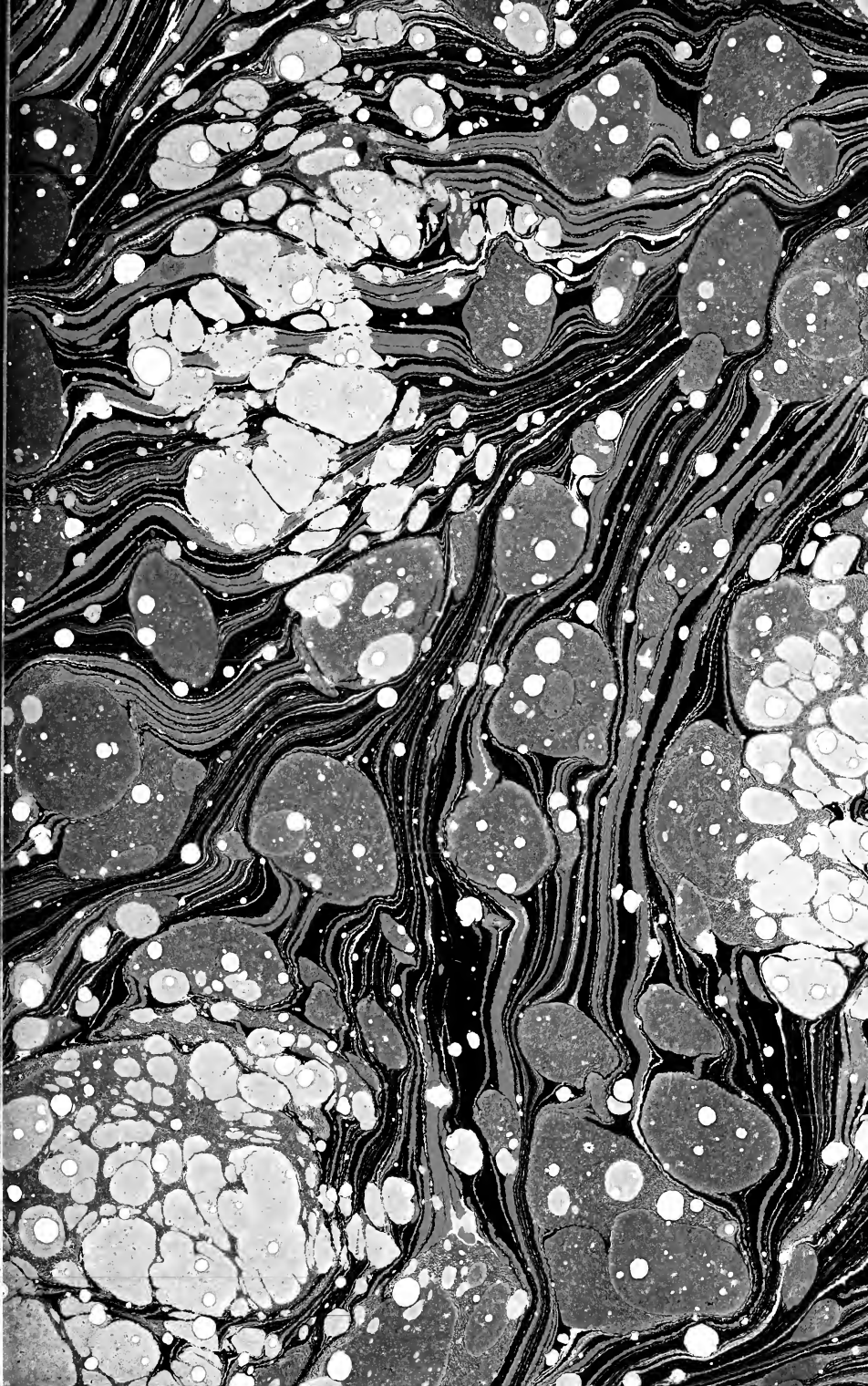


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# Grevillea,

A QUARTERLY RECORD OF  
CRYPTOGAMIC BOTANY  
AND ITS LITERATURE.

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"Rust, Smut, Mildew, and Mould," &c., &c.*

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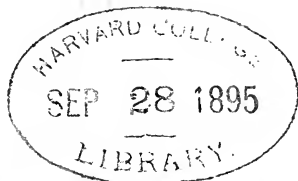
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# Grevillea,

A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY  
AND ITS LITERATURE.

## NEW BRITISH FUNGI.

By M. C. COOKE, M.A.

(Continued from Vol. IV, page 168.)

**Agaricus (Entoloma) Thomsoni.** *B. & Br. Ann. N.H., No. 1523.*

Pileus plane, grey, tomentose, reticulated with ribs; stem paler, fibrillose, tomentose, gills broad, flesh-colour.

Amongst grass in a plantation. West Farleigh.

Pileus  $1\frac{1}{4}$  to nearly 2 in. across, adorned with raised radiating ribs, which form reticulations in the centre. Stem  $1\frac{1}{2}$  line high, about 2 lines thick. The structure seems entirely peculiar to this species, for the ribs are not like those of *A. phlebophorus*.—*B. & Br.*

**Agaricus (Pholiota) terrigenus.** *Fr. Ep. 215.* Var. **minor**.—*B. & Br. Ann. N.H., No. 1533.*

Amongst chips of hop-poles.

**Agaricus (Pholiota) unicolor.** *Fr. Ep. 225.*

Pileus rather fleshy, campanulate, then convex, subumbonate, smooth, nearly even, hygrophaneous, stem stuffed, then fistulose, nearly smooth, of the same colour, ring thin, entire, gills adnate, seceding, broad, somewhat triangular, ochraceous cinnamon.—*Fl. Dan. t., 1071, f. 1. Bull., t. 530, f. 2. Berk. & Br. Ann. N.H., No. 1524,*

On trunks. Hereford.

Subcaespitose, small, bay-brown then ochraceous, at length the margin is striate. Stem pallid, fuliginous at the base.

**Agaricus (Inocybe) maritimus.** *Fr. Ep. 229.*

Pileus convex, then expanded, obtuse; flocculoso-fibrillose, somewhat scaly, hygrophaneous; stem solid, floccoso-fibrillose, gills adnate, ventricose, broad, rather distant, grey, becoming ferruginous.—*Fl. Dan. t. 1846, f. 1? Berk. & Br. Ann. N.H., No. 1525.*

In sand. Glamis. Menmuir.

**Agaricus (Inocybe) descissus.** *Fr. Ep. p. 233.*

Pileus rather fleshy, conical, campanulate, fibrillose, cracked, stem somewhat hollow, equal, undulated, fibrillose, whitish pulveru-

lent above; gills nearly free, linear, crowded, whitish, then brownish.—*Batt. t.* 18 f. *Berk. & Br. Ann. N.H., No.* 1526.

In woods.

**Agaricus (Inocybe) Whitei.** *B. & Br. Ann. N.H., No.* 1527.

Pileus convex, at first hemispherical, fulvous, margin white, slightly viscid, veil white, fibrillose, at length expanded; wholly fulvous, stem white becoming brownish, nearly smooth, solid, gills at first white, annexed.

Rannoch. Oct.

Stature that of *A. geophyllus*. A very curious and beautiful little species, allied to *A. ventricosus*.

**Agaricus (Hebeloma) firmus.** *P. Fr. Ep. p.* 238.

Pileus fleshy, campanulate, then expanded, umbonate, viscid, brick-red, discoid; stem solid, firm, pallid, attenuated, clad with floccose scales, gills rounded, crowded, dry, clay-coloured, then ferruginous, with a whitish serrate margin.—*B. & Br. Ann. N.H., No.* 1531. *Pers. Ic. & Desc. t.* 5, f. 3-4.

Near fir trees. Oct.

**Agaricus (Flammula) lupinus.** *Fr. Ep.* 246.

Pileus fleshy, flattened or depressed, even, viscid, stem stuffed, short, firm, unequal, tinged with adpressed ferruginous fibrils, apex white; gills adnato-decurrent, rather crowded, broad, pale clay-colour.—*Berk. & Br. Ann. N.H., No.* 1528.

In grassy places. Glamis.

Pileus 3-4 in. broad; stem  $\frac{1}{2}$  in. thick; flesh soft, white.

**Agaricus (Flammula) apicreus.** *Fr. Ep.* 249.

Pileus fleshy, thin, nearly plane, even, smooth, moist, stem hollow, equal, pallid, ferruginous at base, gills adnate, crowded, thin, bright, ferruginous.—*Bull. t.* 554. *A. (B. major.) Berk. & Br. Ann. N.H., No.* 1529.

On rotten trunks. New Pitsligo.

**Agaricus (Naucoria) temulentus.** *Fr. Ep. p.* 262.

Pileus rather membranaceous, campanulate, then convex, smooth, hygrophanous, margin slightly striate; stem fistulose, thin, tough, polished, flexuose, smooth, pulverulent above; gills attenuated behind, adnate, rather distant, lurid umber, then ferruginous.—*Batsch. t.* 7. *Berk. & Br. Ann. N.H. No.* 262.

In moist woods. Glamis.

Slender. Pileus ferruginous, ochraceous, tan-colour when dry, and without striæ. Veil none.

**Agaricus (Naucoria) graminicola.** *Nees Sys. f.* 186. *Fr. Ep.* 265.

Pileus somewhat membranaceous, convex, papillate, hairy-tomentose; stem slender, tough, hirsute, becoming tawny; gills slightly adnexed, rather distant, pallid ochraceous.—*Nees Sys. f.* 186. *Krombh. t.* 3, f. 13. *B. & Br. Ann. N.H., No.* 1532.

On grass. Glamis.

Pileus 3 lines broad, under a lens seen to be covered with stri-gose hairs, brown, becoming ochraceous fawn-coloured.



**Agaricus (Psalliota) hæmorrhoidarius.** *Schulz. Kalchb., p. 29, t. 18, f. 1.*

Pileus fleshy, ovate, then expanded, rufous-brown, covered with broad adpressed scales, margin at first bent inwards, flesh when broken turning blood-red; stem soon hollow, fibrillose, solid at the base and somewhat bulbous, ring broad; gills free, approximate, crowded, rosy flesh-colour, then purplish-umber.—*B. & Br. Ann. H.N., No. 1534.*

At the root of oaks. Nov.

The whole plant turns red when bruised or cut. Pileus 4 in. across; stem 4 in. high, 1 in. thick.

**Agaricus (Galera) vittæformis.** *Fr. Ep. 269.*

Pileus membranaceous, conico-campanulate, papillate, margin striate, bright brown; stem equal, flexible, even; gills adnate, ascending, linear, clay-coloured, then cinnamon.—*Schæff. t. 63, f. 4-6. B. & Br. Ann. N.H., No. 1535.*

Amongst moss. Nov. Perth.

Stem rubiginous,  $1\frac{1}{2}$  in. long,  $\frac{1}{2}$  line thick, hispid under a lens; pileus 3-5 lines high and broad, ferruginous, brown.

**Agaricus (Stropharia) caput-medusæ.** *Fr. Ep. 288.*

Pileus fleshy, fragile, ovate then expanded, lacunose, squamulose, discoid; stem hollow above, squarrose with imbricate scales below the ring; gills adfixed, ventricose, clay coloured then pallid umber.—*B. & Br. N.H., No. 1536.*

In pine woods.

Stem 2-3 in. long,  $\frac{1}{2}$  in. thick, solid at the base, whitish, ring resembling that of *A. procerus*, but persistent; pileus umber at the top, tan-coloured at the circumference.

**Agaricus (Hypholoma) cascus.** *Fr. Ep. 294.*

Pileus somewhat fleshy, oval, then expanded, soft, becoming smooth, rugulose, growing pale; disc obtuse, even; stem hollow, equal, fibrillose, white, somewhat pruinose; gills rounded, adnixed, ventricose, dry, grey then dark brown.—*B. & Br. Ann. N.H., No. 1537.*

In grassy places.

Gregarious. Stem 3-4 in. long, 2-3 lines thick; pileus  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. broad; gills 4 lines broad; margin becoming whitish.

**Agaricus (Deconica) ammophilus.** *Mont. Flor. Alg. t. 31.*

Pileus somewhat fleshy, hemispherical, then umbonate, stem soft, hollow, sunk to the middle in sand, base clavate—gills somewhat decurrent with a tooth, dingy with the black pulverulent spores. *Fr. Ep. 299.*

In sea sand amongst *Elymus*. St. Andrew's, N.B.

**Agaricus (Psilocybe) chondrodermus.** *B. & Br. Ann. N.H., No. 1538.*

Pileus campanulate, fleshy, except the appendiculate margin, quite smooth, even, bright brown, here and there cracked; stem nearly equal, fistulose, paler, squamulose at the base; gills ventricose, affixed, seceding; margin white.

In pine woods. Glamis.

Pileus 1 in. across; stem  $2\frac{1}{2}$  lines thick, above 3 at the base; spores .00025 in. long, half as much wide, purple-black, almost oblong; pileus stains the paper yellow.

**Agaricus (Psilocybe) nucisedus.** *Fr. Ep. p. 300.*

Pileus rather fleshy, convex, obsolete umbonate, even, silky when dry; stem fistulose, pallid, attenuated upwards, brownish, downy; gills adnate, broad, plane, brown then dark umber.—*B. & Br. Ann. N.H., No. 1539.*

Amongst small chips in a wood. West Farleigh, Kent.

Stem slender, 1-2 in. long; apex sometimes pruinose; pileus yellowish.

**Agaricus (Psathyrella) caliginosus.** *Jungh. Linn. v. 5, t. 6, f. 13.*

Pileus rather fleshy, campanulate, obtuse, even, smooth; stem equal, even, naked, of the same colour; gills slightly adnexed, ascending, lanceolate, fuliginous then black.—*Fr. Epic. p. 312. B. & Br. Ann. N.H., No. 1540.*

In grassy places. Glamis.

Delicate, small, brown.

**Cortinarius (Phlegmacium) claricolor.** *Fr. Ep. p. 336.*

Pileus compact, flattened, smooth, shining when dry, sometimes squamose; stem solid, attenuated, at first floccosely scaly, white; gills somewhat adnexed, crowded, serrate, greyish-white then pallid.—*B. & Br. Ann. N.H., No. 1541.*

In woods. Glamis.

Pileus yellow, flesh white.

**Cortinarius (Phlegmacium) sebaceus.** *Fr. Ep. 337.*

Growing pallid. Pileus fleshy, expanded, somewhat repand, rather viscid, flesh white; partial veil very fugacious, white; stem solid, stout, equal, fibrillose; gills emarginate, scarcely crowded, clay coloured.—*B. & Br. Ann. N.H., No. 1542.*

In pine woods. Glamis.

Stem 3-4 in. long,  $\frac{1}{2}$  in. thick; pileus  $2\frac{1}{2}$ -5 in. broad, tan-coloured.

**Cortinarius (Phlegmacium) decoloratus.** *Fr. Ep. 351.*

Pileus fleshy, thin, expanded, obtuse, viscid, even, soon dry, floccose, and discoloured; stem attenuated from the thickened base, fibrillose-striate, silvery, naked above; gills emarginate, somewhat crowded, whitish or bluish-grey, then clay-coloured cinnamon.—*B. & Br. Ann. N.H., No. 1541 bis.*

In woods. Epping.

Stem 3 in. long,  $\frac{1}{2}$  in. thick; pileus 2-4 in. broad, clay-coloured; gills 3-4 lines broad.

**Cortinarius (Phlegmacium) croceo-cæruleus.** *Fr. Ep. p. 352.*

*Vers. Ic. Desc. t. 1, f. 2.*

Pileus fleshy, thin, convex then plane, even, viscid, lilaceous; stem hollow, fragile, equal, smooth, whitish; gills emarginate, with a decurrent tooth, rather distant, lilac then clay-coloured, or saffron-yellow.—*B. & Br. Ann. N.H., No. 1543.*

In beech wood. Laxton Park, Norths.

**Cortinarius (Inoloma) cyanites.** *Fr. Ep. 361.*

Pileus fleshy, obtuse, silky, becoming smooth, pallid blue; stem bulbous, smooth, blue, containing a blood-red juice; gills rounded, rather crowded, at first bright steel blue.—*B. & Br. Ann. N.H., No. 1544.*

In wood. Reading.

**Cortinarius (Inoloma) redimitus.** *Fr. Ep. 363.*

Pileus fleshy, rather thin, at length broadly gibbous, golden-yellow, variegated with darker adpressed fibrils; stem fibrillose-striate, slightly thickened at the base; gills emarginate, distant, tawny cinnamon.—*B. & Br. Ann. N.H., No. 1545.*

In woods. Glamis.

**Cortinarius (Dermocybe) camurus.** *Fr. Ep. 367.*

Fragile. Pileus fleshy, thin, gibbous, becoming smooth, unequal, brownish, then growing pallid; stem rather hollow, equal, curved, white within and without, silvery and shining above; gills somewhat adnate, crowded, thin, clay-coloured, grey then brownish.—*B. & Br. Ann. N.H., No. 1546.*

In woods.

Stem 3-4 in.  $\times$  3-4 lines; pileus 2-3 in. broad, smooth, not hygrophanous, yellowish, disc darker, flesh white; gills 2-3 lines broad.

**Cortinarius (Dermocybe) myrtilinus.** *Fr. Ep. 368.*

Pileus fleshy, gibbous, then flattened, fuliginous, becoming hoary with white silky fibrils; stem stuffed, bulbous, silky, whitish; gills adnate, somewhat distant, amethystine blue, then bluish and clay-coloured.—*Bolt. t. 147 (sec Fries). B. & Br. Ann. N.H., No. 1547.*

In woods. Scotland.

Colour and habit of *Ag. nudus*.

**Cortinarius (Dermocybe) venetus.** *Fr. Ep. 374.*

Pileus fleshy, thin, convex, then expanded, silky or villous, olivaceous then yellowish, opaque; stem stuffed, then hollow, firm, fibrillose-striate, and as well as the veil of the same colour; gills rounded-adnate, somewhat distant, broad, veined, olive-yellow, then olivaceous cinnamon.—*B. & Br. Ann. N.H., No. 1548.*

In woods. Rannock. Perth.

Gregarious; pileus  $1\frac{1}{2}$ -2 in. broad, obtusely umbonate.

**Cortinarius (Telamonia) licinipes.** *Fr. Ep. p. 376.*

Fragile; pileus between fleshy and membranaceous, convex, then expanded, umbonate, smooth, pale red, hygrophanous; stem stuffed, then hollow, subequal, pallid, clad with floccose white scales; gills adnate, carried through, pallid, then watery cinnamon.—*Bull t. 600 f., x. w. t. B. & Br. Ann. N.H., No. 1549.*

In fir woods.

Stem 4 in. long, 3-4 lines thick, villous at the base; pileus 2-3 inches and more broad.

**Cortinarius (Telamonia) plumiger.** *Fr. Ep. p. 377.*

Pileus fleshy, thin, conic, then campanulate, gibbous, sub-oliva-

ceous then tawny, clad with dense white flocci, plumose or silky; stem solid, clavately bulbous, floccose, somewhat annulate, growing pallid; gills adnate, scarcely crowded, broad, violet, then cinnamon, margin entire and of the same colour.—*B. & Br. Ann. N.H., No. 1550.*

About trunks in moist places. Glamis.

A single small specimen, densely plumose: stem 3-4 in. long, 1 inch thick at the base; pileus 3 in. broad.

**Cortinarius (Telamonia) punctatus.** *Fr. Ep. 382.*

Pileus somewhat membranaceous, conical-convex, smooth, hoary, umber, tan-coloured, at length even; stem rather fistulose, equal, slender, undulate, fibrillose-striate, yellowish-tawny, girt by a pallid-brown fugacious veil; gills adnate, distant, quite entire, brown then cinnamon.—*B. & Br. Ann. N.H., No. 1551.*

In beech woods.

**Cortinarius (Hydrocybe) detonsus.** *Fr. Ep. p. 397.*

Pileus somewhat membranaceous, conical, then expanded, rather umbonate, smooth, reddish or yellowish (tan-coloured, stem stuffed), then hollow, attenuated upwards, smooth, yellowish pallid; gills adnate, thin, rather distant, yellowish, then testaceous, quite entire.—*B. & Br. Ann. N.H., No. 1552.*

Amongst moss in woods. Glamis.

Pileus  $1\frac{1}{2}$ -2 in. broad.

**Cortinarius (Hydrocybe) milvinus.** *Fr. Ep. p. 399.*

Pileus membranaceous, conical, expanded, somewhat umbonate, smooth, striate to the broad rather fleshy disc, sub-olivaceous (pale tan-colour), margin crowned with innate white scales; stem almost fistulose, equal, curved, tawny, pallid, spotted with the silky white veil; gills adnate, rather distant, thin, olivescens, ferruginous, veined at the base.—*B. & Br. Ann. N.H., No. 1553.*

In woods. Wrotham, Kent. Oct.

Stem 2-3 in. long, 2 lines thick; pileus  $\frac{1}{2}$ -1 in. broad, fawn-coloured, becoming olive, strong scented.

**Paxillus Lepista.** *Fr. Ep. p. 402.*

Pileus fleshy, flattened, depressed, dry, silky or smooth, dirty whitish, cracked and scaly about the margin; margin thin, involute, even, naked; stem solid, thick, with a horny cuticle contiguous with the hymenophore and similar; gills deeply decurrent, rather branched, crowded, dirty white, then darker.—*B. & Br. Ann. N.H., No. 1554.*

Slough.

The rigid, almost horny cuticle, large size, and thick stem render this one of the most remarkable of the *Agaricini*.

**Paxillus paradoxus** (*Agaricus paradoxus*). *Kalch. t. 16, f. 1.*  
*Fr. Ep. 244.*

Pileus fleshy, convex, then plane, dry, tomentose, rufous-umber; stem solid, somewhat rooting, unequal, fibrillose, yellow or reddish; gills decurrent, distant, connected by veins, yellow, then golden

yellow, becoming reddish when old.—*B. & Br. Ann. N.H.*, No. 1555.

Amongst decayed ferns. Shrewsbury. Wrotham. Sept.

Pileus 2-3 in. across.

The spores are more like those of a *Boletus* than an *Agaric*. They are oblong, .00035-.00036 in., and about one-fourth as much wide.

**Lactarius squalidus.** *Kromb. t. 4, f. 23-25.*

Pileus compact, convexo-plane, umbilicate, dry, smooth, without zones, pallid, lurid; stem solid, equal, smooth, pallid brown; gills adnate, narrow, becoming yellowish; milk whitish, mild.—*Fries Ep. ii.*, 428. *B. & Br. Ann. N.H.*, No. 1556.

In moist places. Scotland.

**Lactarius minimus.** *Sm. in Journ. Bot.* 1873, p. 205.

*Fries Epicr. ii.*, p. 438. *B. & Br. Ann. N.H.*, No. 1557.

In pastures. Forres.

**Hygrophorus discoideus.** *Fr. Ep. p. 408.*

Pileus fleshy, thin, convex or gibbous, then plane or depressed, even, smooth, glutinous, grey, becoming pallid, disc darker and rather ferruginous; stem stuffed, soft, flocculose, viscid, whitish, punctate above; gills adnate then decurrent, thin, soft, growing pallid.—*Gonn. & Rabh. viii. t. 10, f. 4.* *B. & Br. Ann. N.H.*, No. 1558. *Agaricus semigilvus*, *Secr.*, No. 771.

In grassy places. Laxton Park, Norths.

Solitary or tufted; stem dotted all over with viscid granules.

**Hygrophorus cinereus.** *Fr. Ep. p. 413. Att. Scamp. t. 30.*

Pileus thinner, and gills cinereous; stem white, otherwise the same as *Hygr. pratensis*.—*B. & Br. Ann. N.H.*, No. 1561.

In mossy places. Coed Coch, &c.

**Hygrophorus sciophanus.** *Fr. Ep. p. 417.*

Somewhat testaceous, pileus rather fleshy, convex, then depressed, obtuse, slightly viscid, opaque, margin striate; stem hollow, equal, subflexuous, even; gills decurrent, distant, connected by veins.—*B. & Br. Ann. N.H.*, No. 1560.

In mossy places. Perth.

Spores very pale clay-coloured. There were two forms, one with a darker pileus and the flesh dark, the other paler, with the flesh also pale. The former only deposited spores, it is probable therefore that the pale form was not so fully developed.

**Russula olivacea.** *Fr. Ep. p. 445.*

Mild; pileus fleshy, convex, then plane or depressed, silky and squamulose, margin patent, even, flesh white, or becoming yellowish; stem firm, ventricose, rosy-pallid, spongy and stuffed within; gills annexed, broad, yellow, mixed with shorter ones, and furcate.—*Schæff. Ic. t. 204. Krombh. t. 68 f. 13.* *B. & Br. Ann. N.H.*, No. 1562.

In pine woods. Slough.

Spores yellow.

**Russula galochoa.** *Fr. Ep. p. 447. Bull t. 509, L.M.*

Small: pileus at first milk white, then becoming greenish, rarely spotted with scattered white floccose spots; margin even or faintly striate; gills as in *Russula heterophylla*.—*B. & Br. Ann. N.H., No. 1563.*

In birch woods. Slough.

**Russula pectinata.** *Fr. Ep. p. 449. Bull t. 409, N.O.P.*

Acrid; pileus fleshy, rigid, flattened or depressed, opaque, discoid, margin sulcate, flesh yellowish beneath the adnate viscid cuticle; stem spongy, stuffed, rigid, striate, white; gills attenuated behind, free, crowded, equal, simple, white.—*B. & Br. Ann. N.H., No. 1564.*

Glamis.

Smell like that of *R. fætens*; pellicle separable; pileus 3 in. across, disc darker.

**Cantharellus Houghtoni.** *Phillips.*

Pileus thin, convex, umbilicate, smooth; stem slender, incrassated at the apex, at first delicately fibrillose; gills sub-decurrent, narrow, pale flesh colour.—*B. & Br. Ann. N.H., No. 1565.*

On the ground. Hereford.

Pileus 1 in. or more across, dirty-white, with a tinge of flesh colour; stem 2 in. high, 1 line thick, stuffed, rooting at the base, which is more or less cottony; gills scarcely forked, narrow, slightly decurrent, sometimes 2 inches across.

**Marasmius epichloe.** *Fr. Ep. 479.*

Pileus thin, plano-convex, somewhat papillate, without striæ, whitish, centre bay-brown; stem bay, opaque, sulcately striate, striæ setulose, base paler; gills rounded, rather crowded, broader behind.—*B. & Br. Ann. N.H., No. 1566. Marasmius gramineum, Lev.*

On the base of grasses. Hereford.

**Lentinus pulverulentus.** *Fr. Ep. p. 482.*

Pileus fleshy, scarcely convex, yellow; stem stout, elongated, equal, rigid, powdered with whitish mealy particles; gills denticulate, white.—*B. & Br. Ann. N.H., No. 1567. Agaricus pulverulentus, Scop. Carn. p. 434.*

On trunks. Glamis.

Tufted, at first infundibuliform, then lateral, flabelliform, fuliginous, floccoso-pulverulent with little umber particles; stem elongated, at length smooth; gills thick, pallid, deeply decurrent, their edge crenulate, but not torn; pileus 2 in.; stem 3 in. high.

**Polyporus (Resupinatæ) subgelatinosus.** *B. & Br. Ann. N.H., No. 1569.*

Orbicular; margin elevated, subgelatinous, whitish, tomentose, becoming blackish; pores grey, small, edge acute.

On dead wood. Rannoch.

Apparently parasitic on a decurrent form of *P. amorphus*.



This singular species forms little pulvinate masses, with an obtuse raised border, which is at first tomentose and pallid, of a subgelatinous consistence and turning black. The pores are of a pale delicate grey, with an acute even edge, about  $\frac{1}{40}$  inch diameter.

**Trametes inodora.** *Fr. Ep.* 584.

White. Pileus corky, firm, becoming smooth, without zones; pores minute, rounded, entire, not discoloured.—*B. & Br. Ann. N.H.*, No. 1570.

On the flat top of an old mossy beech stump. Stoke Poges.

Pores colourless, slightly angular, about  $\frac{1}{10}$  inch wide, nearly  $\frac{1}{4}$  in. long, not the least linear. Inodorous, externally tomentose, white, with a very slight tinge of pink at the base. As in *Dædalea latissima*, the texture radiates from a central point, and is of a pure white.

**Trametes Terrei.** *B. & Br. Ann. N.H.*, No. 1571.

Resupinate, broad, suborbicular, pulvinate; substance corky, white; pores angular, here and there sinuate, pallid.

On beech. Stoke Poges.

About 3 inches across, 1 inch thick in the centre; substance white, delicately fibrous, radiating from a central point, zoneless; pores about  $\frac{1}{40}$  inch across, pallid, angular in the centre, sinuated towards the edge. Inodorous. Habit that of *Dædalea latissima*.

**Hydnum lævigatum.** *Swartz. Fr. Ep.* 599. *Atl. Scamp. t.* 81.

Pileus fleshy, compact, firm, regular, plane, even, quite smooth, umber; margin circinate; stem thick, even, as well as the thin spines, pallid.

In pine woods. Rannoch.

**Irpex pendulus.** *Fr. Ep.* 620.

Pileus membranaceous, plicate, adpressedly squamose, yellow porrectis behind, pendulous; teeth serrate, large, incised, white.—*Alb. & Schw. Consp. t.* 6, *f.* 7.

On wood.

**Thelephora pallida.** *Fr. Ep. p.* 633.

Cæspitose. Pileus between corky and coriaceous, infundibuliform, entire, strigose-squamose, pallid then rufescent; stem very short; base villose; hymenium costate, setulose pallid.—*Pers. Ic. & Desc. i. t. i. f.* 5.

On the ground.

**Thelephora clavularis.** *Fr. Ep. p.* 634.

Between soft and coriaceous, irregularly branched, rufous-brown; branches terete, attenuated, even, smooth, delicately pruinose; apices acute, pubescent, whitish; stem somewhat tuberous.—*Fr. Obs. i. t. i. f.* 1.

On the ground in pine woods.

**Thelephora crustacea.** *Schum, Fr. Ep. p.* 637.

Broadly effused, somewhat fleshy, undulated, or tuberculose, umber brown; circumference whitish floccose; hymenium papillose,

setulose.—*Flor. Dan. t. 1851, f. 2. B. & Br. Ann. N.H., No. 1577.*

On the ground. Burnham. Epping (J. English).

**Stereum vorticosum.** *Fr. Ep. 639.*

Pileus coriaceous, effused, reflexed, obscurely zoned, strigosely hairy, pallid, margin of the same colour; hymenium somewhat costate, smooth, becoming purplish.—*Bull. t. 483, f. 1-5.*

On trunks of birch.

**Stereum rufum.** *Fr. Ep. p. 644.*

Between coriaceous and cartilaginous, erumpent, tuberculiform, then somewhat rounded, marginate, rufous, becoming brownish, smooth beneath; hymenium greyish, pruinose, at length bullately tuberculose.

On lime bark. Glamis.

**Corticium salicinum.** *Fr. Ep. 647.*

Coriaceous, soft, rigid when dry, persistently cup-shaped, fixed at the centre, externally whitish villose; hymenium nearly even, naked, persistently blood-red, contiguous when dry.—*B. & Br. Ann. N.H., No. 1581.*

On willow branches. Forres.

This is certainly the same with *Exidia cinnabarina*, B. & C., which has the curved spores of *Exidia*. We have not sufficient specimens of the European form to justify us in separating it from *Corticium*, to which genus it can scarcely belong.—*Berk. & Br. l.c.*

**Corticium amorphum.** *Fr. Ep. 647.*

Messrs. Berkeley and Broome have some important remarks on this species in "Ann. Nat. Hist." (Feb., 1876), p. 137, to the following effect:—

"This curious plant is so like large specimens of *Peziza calycina* that it is not surprising that the two should have been confounded, and in consequence the plant figured by Wilkomm under that name is really *P. calycina*. We were at first inclined to think that it might be a conidiiferous form of the *Peziza* in question, analogous to *Cyphella Curreyi*, but the structure is such as to make us consider it autonomous, and probably the type of a new genus, for it does not agree well with the characters of *Corticium*. The substance is white and fleshy, consisting of rather coarse threads, which at the base form a close sclerotoid network. The hymenium consists of colourless threads, and orange-coloured, clavate bodies filled with pigment. These at length project beyond the surface, and produce four globose rough spores  $\cdot 001$  in. in diameter, which contain an angular body within, which looks like a cystolith. After a time each spore becomes elliptic, and now measures  $\cdot 0012$  in. in length, produces about eight elliptic echinulate sporidia in its cavity, which are from  $\cdot 0004$ – $\cdot 0005$  in. long—a circumstance without parallel, as far as we know, in Hymenomycetes. All these points have been observed by each of us independently" (pl. 9, fig. 1).

These observations differ considerably from those described in "Grevillea," vol. iii., p. 136.

**Corticium cinnamomeum.** *Fr. Ep.* 650.

Effused, confluent, and irregular adpressed, cinnamon beneath, and circumference fibrilloso-strigose; hymenium fleshy, soft, smooth, naked, of the same colour, cracked when dry.—*B. & Br. Ann. N.H., No.* 1584.

On wood and bark of oak. Glamis.

**Corticium serum.** *Fr. Ep.* 659.

Broadly effused, incrusting thin, white, fleshy when recent, smooth, pruinose; when dry flocculose, cracking, papillæ, rounded, crowded, equal.—*B. & Br. Ann. N.H., No.* 1583. *Thelephora sera, Pers. Syn.* 580.

On trunks. Epping. Scotland.

**Corticium ferrugineum.** *Fr. Ep.* 661.

Effused, adnate, everywhere tomentose, ferruginous; hymenium papillose, pulveraceous.—*B. & Br. Ann. N.H., No.* 1585.

On wood and bark. Wothorpe, Scotland.

**Clavaria Krombholzii.** *Fr. Ep.* 669.

Fragile, cæspitose, even, white, sparingly branched, branches somewhat compressed, obtuse.—*B. & Br. Ann. N.H., No.* 1586. *Clavaria Kunzei, Krombh. t.* 53, *f.* 15, 16.

On the ground in woods. Glamis.

**Clavaria condensata.** *Fr. Ep.* 672.

Very much branched from the base, smooth, tan-coloured, rufescent, trita unchangeable; branches straight, parallel, crowded, even, fastigate at the apices, 2-3 dentate, yellowish.—*Schæff. Ic. t.* 177. *B. & Br. Ann. N.H., No.* 1587.

In woods. West Farleigh.

**Calocera palmata.** *Fr.*

Branched, between tremellose and tough, orange-yellow, compressed, dilated upwards, divided, branches straight, divaricate, obtuse.

On wood. Twycross.

**Pterula subulata.** *Fr. Ep.* 682.

Very densely crowded, straight, sparingly branched; branches growing together, whitish cinereous, multifid at the apices; subulate, smooth, yellowish.—*Fries Linn.* 1830, *t.* 11, *f.* 4. *B. & Br. Ann. N.H., No.* 1588.

On moist ground.

Tough, 1½ in. high.

**Typhula translucens.** *B. & Br. Ann. N.H., No.* 1589.

White, pellucid; stem short, incrassated upwards, head irregularly subovate.

On the ground. Glamis.

Minute, resembling somewhat a prematurely dried Myxogast.

**Hymenula constellata.** *B. & Br. Ann. N.H., No.* 1590.

Orbicular, then densely crowded, pallid; spores minute, fusiform.

On a decayed board.

Formerly referred to *Fusarium minutulum*, Ca. Individual plants about .007 in. across, densely crowded in the centre, scattered towards the margin of the patches, composed of compact branched threads bearing minute spores, .0002 in. long, in a dense stratum.

**Geaster mammosus.** *Fr. Sys. iii.* 17. *Cooke Handbook*, No. 1076.

This curious species, of which no other British specimen was known than that figured by Sowerby, was lately found in Berkshire by the Rev. G. H. Sawyer.—*B. & Br. Ann. N.H.*, Feb. 1876, p. 139.

**Lycogala flavo-fuscum.** *Ehrb.*

Somewhat pulvinate, peridium membranaceous, firm, even, flocci adnate to the walls, reticulated, and, as well as the spores, of a greyish-brown.—*B. & Br. Ann. N.H.*, No. 1591. *Reticularia flavofusca.* *Fr. Sys. Myc. iii.* p. 88.

On trunks. Coed Coch.

Named as above on the authority of Rostafinska.

**Reticularia olivacea.** *Fr. Sys. III.* 89.

Peridium membranaceous, somewhat plicate, hyaline, flocci adnate, dendroid reticulate; spores greenish then olive.—*B. & Br. Ann. N.H.*, No. 1592.

On decayed fir. Aboyne.

**Chondrioderma Ærstedii.** *Rostf.*—*B. & Br. Ann. N.H.*, No. 1593.

On bark, more or less covered with moss. Jedburgh.

Up to the present we have been unable to meet with any description of this species, and the next, which are named on the authority of Rostafinska.

**Chondrioderma niveum.** *Rostf.*—*B. & Br. Ann. N.H.*, No. 1594.

On dead wood. Linlithgow.

**Badhamia capsulifer.** *Bull. t.* 470, f. 2 (sub. *Sphærocarpus*.)

The peridia reflect the most beautiful tints of steel blue and lilac, and are densely crowded; spores rough.—*B. & Br. Ann. N.H.*, No. 1595. (not *Fungi Britt.*)

Glamis.

**Physarum theioteum.** *Fr. Sys. III.* 142.

Elongated, stipitate, small, peridia between ovate and globose, squamulose, yellow, flocci of the same colour; spores purple-brown.—*B. & Br. Ann. N.H.*, No. 1596. *Physarum virescens*, *Ditm. Sturm.*, t. 61.

On little twigs. Glamis.

**Physarum tussilaginis.**—*B. & Br. Ann. N.H.*, No. 1597.

Peridia depressed, adnate, very thin, shining, capillitium thin, truncated, white; spores globose, rough.

*Badhamia capsulifera*, *Cooke, Fungi Britt.* i. 526, ii. 206.

On leaves of *Tussilago*.

**Physarum nigrum.** *Fr. Sys. Myc. III.* 146.

Black; peridia delicate, subrotund, irregular and unequal, flocci copious, interwoven, black as well as the globose spores.—*B. & Br. Ann. N.H.* No. 1598.

On decayed wood. Glamis.

Threads slender ; spores nearly black, .0007 in. diam.

**Physarum atrum.** *Fr. Sys.* III. 147.

Stems aggregated, confluent, black, peridia delicate, rounded, flocci absent ; spores black.—*B. & Br. Ann. N.H. No. 1598.\**

On very decayed *Populus alba*.

**Craterium leucostictum.** *Fr. Sys.* III. 152.

Gregarious ; peridia pear-shaped, erect, becoming whitish, operculum convex, of the same colour, stem short, even ; spores black.—*B. & Br. Ann. N.H., No. 1599.*

On dead leaves. Glamis.

**Cribraria macrocarpa.** *Schrad. t. 2, f. 3.*

Gregarious, bay-brown ; peridia erect, obovate, reticulations unequal ; spores yellowish.—*B. & Br. Ann. N.H., No. 1600.*

On pine wood. Glamis.

**Cribraria fulva.** var. *b. intermedia.* *Schrad. t. i. f. 2.*

Gregarious ; peridium erect, pear-shaped, reticulations equal ; spores tawny.—*B. & Br. Ann. N.H., No. 1601.*

On decayed wood. Glamis.

Spores .00035-.0005 in.

**Arcyria Friesii.** *B. & Br. Ann. N.H. No. 1602.*

Gregarious ; peridia stipitate, globoso-ovate, cinereous, capillitium ovate-cylindrical and glaucous as well as the spores.

On sawdust. Glamis.

This plant generally passes for *A. cinerea*, which has not glaucous spores. The capillitium is coarser than in *A. cinerea*, and the spores are decidedly blue. Its habit also is different, the peridia being scattered in *A. cinerea*.

**Arcyria ferruginea.** *Rostk. Mon.—B. & Br. Ann. N.H., No. 1603.*

On dead wood. (Sowerby, Herb.)

Included often in *A. punicea*, from which it differs not only in colour, but in the comparative size of the spores. (*B. & Br.*)

At present we have been unable to meet with a description of this species.

**Arcyria (Lachnobolus) congesta.**—*B. & Br. Ann. N.H.; No. 1604, t. 9, f. 2.*

Forming orbicular masses  $\frac{1}{2}$  in. diameter, consisting of crowded shining umber peridia, looking at first like a *Licea*, flocci rough, and as well as the globose spores of the same colour.

On dry wood.

Spores .0003-.0004 in. diam.

**Lindbladia effusa.** *Fr.*

Effused, pulvinate ; peridia delicate, narrow, closely agglutinated, cylindrical, obtuse at the apex, flesh-coloured, then olivaceous-brown ; spores globose, of the same colour, hypothallus pallid, then dingy, fibrous.—*B. & Br. Ann. N.H., No. 1605. Licea effusa, P. & Ehr., in Ehr. Sylv. Ber., p. 26.*

With *Cribraria argillacea*.

**Perichæna decipiens.**—*B. & Br. Ann. N.H.*, No. 1605, *bis. t. 9, f. 3.*

External appearance the same as in *P. strobilina*, but the spores are bright-yellow, and of two kinds.

On fir cones. Perth.

Macrospores,  $\cdot 0009$ – $\cdot 002$  in. long; microspores,  $\cdot 001$ – $\cdot 0012$  in. long.

## SOME INDIAN FUNGI.

By M. C. COOKE.

(PLATE 74.)

The following small collection of Fungi, chiefly made in India by Colonel Hobson, contains some very interesting species. It is unfortunate that the species of *Rhytisma* are without mature fruit, but this is by no means an uncommon occurrence. The asci being usually matured after the leaves have reposed for some time on the ground, they require careful watching to secure them in a perfect state:—

### **Septoria variegata.** *Vize.*

Epiphylla. Maculis brunneis, griseis, vel pallidis; peritheciis minutis, immersis, cœspitosis; sporis minutis, linearibus, hyalinis.

On large coriaceous leaves.

Spots brown, grey, or pallid on the same leaf; perithecia minute, the punctiform ostiolum bursting through the cuticle; spores minute, narrow, hyaline, straight,  $\cdot 005$  m.m. long.

### **Pestalozzia phœnicis.** *Vize.*

Maculis brunneis; peritheciis minutis, atris, nitidis, subimmersis, hinc illic cœspitosis; sporis subfusiformibus, 4 septatis, bicristatis.

On leaves of *Phœnix dactylifera*.

The small shining black perithecia are here and there collected together on discoloured spots. The spores are seated on long hyaline peduncles, quadrisepate, the upper cell hyaline and crested, the intermediate three cells brown. Length of the coloured portion  $\cdot 018 \times \cdot 007$  m.m.

### **Trichobasis Hobsoni.** *Vize.*

Hypophyllis. Soris minutis, sparsis vel gregariis, fulvidis; sporis subovatis, rhomboideisque, leniter asperulis.

On under surface of leaves (tree unknown). Colonel Hobson (164a). *Rhytisma ustulatum* occurs on leaves of the same tree, which may be a *Ficus*.

Spores mostly with a subrhomboid or obtusely angular outline, at first attached to a delicate peduncle; epispore minutely verrucose,  $\cdot 022 \times \cdot 02$  m.m.

### **Trichobasis microspora.** *Vize.*

Epiphylla. Maculis suborbicularis, purpureis; soris 3–8, minutis, erumpentis, pallidis (?); pseudosporis subglobosis parvis, lævibus.



On upper surface of some composite plant.

Sori seated on purplish spots; spores small, subglobose or oval,  $\cdot 012\text{--}\cdot 015 \times \cdot 01$  m.m., pallid in the dried specimens, but probably yellowish when fresh.

**Trichobasis spinulosum.** *Cooke.*

Hypophyllis. Maculis purpureis, orbicularibus, magnis; soris congestis, atro-brunneis; pseudosporis ovatis, brunneis, supra echinulatis, infra lævibus.

On living leaves. Col. Hobson (56).

Sori clustered on large suborbicular purple spots; spores ovate, brown, spinulose at the broader end, smooth at the narrower, at first attached to long robust pedicels,  $\cdot 045 \times \cdot 032$  m.m.

**Lecythea Ricini.** *Lev. Ann. des Sci. Nat.*, 1847, viii., p. 374.

On leaves of *Ricinus communis*.

**Puccinia purpurea.** *C.*

Amphigena. Maculis læte purpureis; soris irregularibus, 3-6 congestis, atro-brunneis; protosporis ovatis, lævibus, brunneis; teleutosporis elongato-ovatis, brunneis, superne hemisphericis, inferne obconoideis, longe stipitatis.

On leaves of *Sorghum vulgare*. Col. Hobson.

Uredo spores  $\cdot 035 \times \cdot 025\text{--}03$  m.m., brandspores  $\cdot 04\text{--}045 \times \cdot 022\text{--}025$  m.m. Both are produced in small sori collected 3-6 on bright purple spots. It seems to be quite distinct from *P. sorghi*, Schw., and *P. maydis*.

**Ravenelia stictica.** *B. & Br.—Ceylon Fungi, Linn. Soc. Journ.*  
*No. 74, p. 93.*

On leaves of *Pongamia*. Col. Hobson (No. 9).

The spores of the uredo-form are  $\cdot 015 \times \cdot 012$  m.m., and the macrospores  $\cdot 05\text{--}07$  m.m.

**Graphiola phœnicis.** *Poit. Cooke, Handbook, No. 1637.*

On leaves of palms. Col. Hobson.

**Cladosporium Buteacolum.** *C.*

Effusum, subolivaceum, tenue; floccis tenuibus, rectis, elongatis; sporis fusiformibus, demum uniseptatis.

On legume of *Butea frondosa*. Col. Hobson (113).

Externally very much like *C. herbarum*, but the long slender flocci are much more delicate, scarcely at all nodulose or constricted; spores fusiform, very variable in length, diameter not exceeding that of the flocci, from  $\cdot 01$  to  $\cdot 03$  m.m. long, and about  $\cdot 005$  m.m. broad.

**Cladosporium puccinioides.** *C.*

Hypophyllum. Maculis brunneis; floccis cœspitibus in soris atro-brunneis congestis, brevissimis ad basim olivaceo-fuligineis; sporis elongatis, rectis, uniseptatis, pallide olivaceis.

On under side of living leaves. Col. Hobson (No. 57).

Forming small sori resembling those of some species of *Puccinia*, seated together on brownish spots; threads dark coloured at the base, paler upwards, densely cœspitose; spores elongated, uni-

septate, .02-.04 m.m. long; threads .04-.08 m.m. long. Threads and spores olive. This is certainly intermediate between *Cladosporium* and *Helminthosporium*.

**Morchella esculenta.** Pers. Cooke, *Handbook*, No. 1938.

On the ground. Kashmir (Dr. Aitcheson).

**Morchella Bohemica.** Kromb. t. 15, f. 1-13, t. 17, f. 5-8.

On the ground. Kashmir (Herb. Berk.).

Eaten by the natives. Dried and sent down into the plains.

**Poronia œdipus.** Mont.

On dung. Col. Hobson.

**Dothidea viventis.** C.

Convexa, nitida, minuta; ascis clavatis; sporidiis biseriatis, subfusiformibus, nucleatis, luteolis.

On living leaves of *Leguminosæ*. Col. Hobson (No. 166).

Asci clavate; sporidia biseriate, somewhat fusiform, nucleate, .02-.025  $\times$  .007 m.m. The spots contain from 1-3 or 4 cells, with corresponding elevations of the shining black surface. Not exceeding half a line in diameter.

**Dothidea demersa.** Corda *Icones* iv, fig. 121.

On living leaves (*Ixora*?). Col. Hobson (81).

Asci cylindrical; sporidia ovate, slightly attenuated to each end, .018  $\times$  .009 m.m.; endochrome granular.

**Dothidea repens.** Corda.

On leaves of *Ficus gossypina*.

India. Dr. Wallich, in Kew Herbarium, under the name of *Lichenoidastrum Hookerianum*, Wall.

**Asterina pemphidioides.** C.

In maculas orbiculares, confluyenteque, disposita; peritheciis hemisphericis, nitidis, pemphidioides, brunneis; mycelio brunneo, evanideo; ascis obovatis; sporidiis ellipticis, uniseptatis, constrictis, brunneis.

On upper surface of leaves. Col. Hobson (No. 149).

Mycelium jointed, brown, bearing ovate lateral processes; asci saccate; sporidia brown, uniseptate, .04  $\times$  .015 m.m., evidently allied to *Asterina pelliculosa*, B. & Br., but with sporidia twice as long.

**Rhytisma conoideum.** C.

Orbicular, demum elevatum, subconoideum, atrum, nitidum.

On leaves. Col. Hobson (150).

From 1-2 lines diameter, orbicular, becoming elevated, and obtusely conical, black, shining, somewhat resembling *R. asteris*, Schw., but smaller and more elevated. Unfortunately, also without fruit.

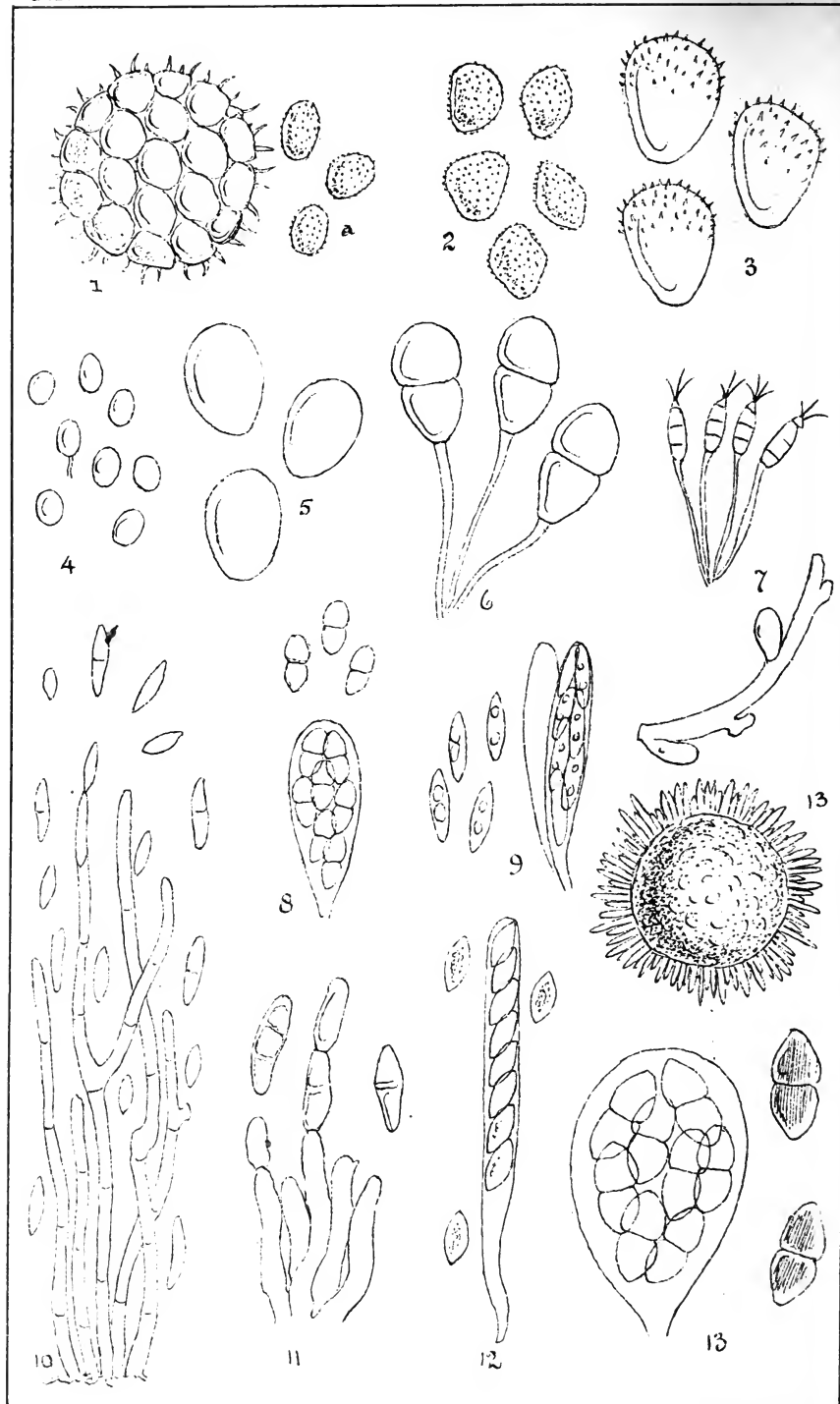
**Rhytisma durissimum.** C.

Crassum, durissimum, elevatum, rugulosum, nitidum, atrum, intus albidis.

On coriaceous leaves. Col. Hobson (87).

Thick and very hard, whitish within, surface rugulose, black,





somewhat shining,  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, suborbicular or irregular, absorbing the substance of the leaf, forming a black spot on the opposite surface. Unfortunately no fruit could be found.

**Rhytisma ustulatum.** C.

Amphigenum, atrum, irregulare; peritheciis elevatis, papillatis; stylosporis linearibus, curvulis; sporidiis incertis.

On dead leaves, probably of *Ficus*. Col. Hobson (164).

Stylospores linear, curved, .02 m.m. long; some free sporidia, .013-.015  $\times$  .005 m.m., hyaline, uniseptate, may belong to this species, but no asci could be found, hence the sporidia are uncertain. The papillate surface of the broad black patches is peculiar, resembling some species of *Dothidea*. The spots do not pass through the leaf as in *R. durissimum*. The substance also is thin and brittle. The spots are from a line to half an inch broad.

**Ailographum Pandani.** C.

Minutum, lineatum, acutum, e macula nigra orbiculare oriundum, labiis tenuis, demum rigentibus; ascis ovatis; sporidiis congestis, ellipticis, uniseptatis, hyalinis.

On leaves of *Pandanus odoratissimus*. Col. Hobson (119).

Perithecia minute, linear, seated, three or four together, on black orbicular spots, compacted of myceloid filaments; lips thin, at length gaping; asci ovate or pyriform; sporidia crowded, elliptical, uniseptate, constricted at the septum, .02  $\times$  .01 m.m.

**Cladosporium delicatulum.** - Cooke.

Epiphyllum, maculæforme. Floccis tenuibus, flexuosis, septatis; sporis ellipticis, subfusiformibus, demum uniseptatis.

On dead leaves. Col. Hobson (No 23).

Forming irregular fuliginous spots, consisting of erumpent tufts of slender flexuous septate flocci, which are not constricted or nodulose. Spores elliptical, pointed at the ends, becoming fusiform and uniseptate, pale amber-coloured spores .012-.018  $\times$  .006 m.m.

PLATE 74.

Fig. 1. *Ravenelia stictica*, B. & C. a. Uredo spores.

2. *Trichobasis Hobsoni*, Vize.

3. *Trichobasis spinulosum*, C.

4. *Trichobasis microspora*, Vize.

5. *Trichobasis purpureum*, C.

6. *Puccinia purpurea*, C.

7. *Pestalozzia Phœnicis*, Vize. Spores 3-4 cristate, and not bicristate, as stated in description.

8. *Ailographum Pandani*, C. Ascus and sporidia.

9. *Dothidea viventis*, C. Asci and sporidia.

10. *Cladosporium Buteacolum*, C.

11. *Cladosporium puccinioides*, C.

12. *Dothidea demersa*, Corda. Ascus and sporidia.

13. *Asterina pemphidioides*, C. Ascus and sporidia.

All the figures magnified 500 diameters.

## THE POTATO FUNGUS.

## GERMINATION OF THE RESTING-SPORES.

By WORTHINGTON G. SMITH, F.L.S.

*With Plates 70 to 73.\**

Before describing the germination of the resting-spores of the fungus which causes the potato disease, it will be well to briefly state how these resting-spores were obtained, and how preserved alive in a state of hybernation for so long a period as a whole year. Readers of the *Gardeners' Chronicle* need not be reminded that I last July obtained the oospores or resting-spores by keeping potato leaves and tubers continually moist. For many years past moisture has been well known to be capable of greatly exciting the growth of *Peronospora infestans*, and De Bary, in his recent essays, classes the potato fungus (p. 242) with "other water fungi." Mr. C. Edmund Broome, of Batheaston, who is known as one of the first cryptogamic botanists of this country, repeated my experiments in the following manner:—He selected potato leaves badly infected with *Peronospora*, partly crushed them, and placed them in a saucer of water under a bell-glass. The saucer was kept in a sloping position, so that the leaves (being partly submerged) were allowed to absorb the water naturally. The result was that he obtained an enormous number of resting-spores in all parts of the leaves, many being within the spiral vessels and hairs. These resting-spores were in every way identical with mine, and they could only belong to the *Peronosporæ* or *Saprolegniæ*, because similar bodies are unknown in other families of fungi. The first-named family has jointed threads, the second bears threads without joints; now as the threads seen by me, and last year illustrated in connection with the resting-spores, had jointed threads, they must belong to *Peronospora*, and not to *Saprolegnia*. As there is no other *Peronospora* than *P. infestans* known to grow upon the potato plant, it is clear that the resting-spores cannot rationally be referred to any other than the potato fungus. Added to this, I last year saw the secondary bodies clearly growing from the *Peronospora* threads. I attach great importance to the jointed threads, because De Bary, when he figures *Artotrogus* from "Montagne's original specimen" (*Recherches*, p. 258), shows the threads with many septa. From the first I have said that Montagne's *Artotrogus* and the bodies discovered by me are the same. That both belong to *Peronospora* the sequel proves.

It was of the highest importance that these resting-spores should be preserved alive till the time arrived for their renewed activity, and with this purpose in view I preserved the material in which the resting-spores were present in sealed bottles, each

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bottle containing more or less pure water or expressed juice of horse dung diluted with water. As I was quite in the dark as to the habits of these resting-spores, of course I did not know what to do for the best, or what the result of my experiments would be. In former numbers of the *Gardeners' Chronicle* I have described how these resting-spores at first floated on the surface of the water, how they at length deposited themselves in the sediment at the bottom, and how on opening one of the bottles at the last meeting of botanists at Hereford the resting-spores were found still intact and apparently alive. Happily, nearly all my spores retained their vitality. Mr. Broome, being equally uncertain with myself, trusted to chance, and chance so far favoured him that all his resting-spores in the slanting saucer of water well retained their life. It might have been (and even was) said that possibly some fungus foreign to the potato fungus had got into my material, but if so it must be regarded as a coincidence, in the highest degree extraordinary, that Mr. Broome should also get the same new and foreign fungus in his *Peronospora* material; a body so puzzling in its nature as to be referred to no less than eight different species of fungi.

All who have studied the habits of the lower fungi know the extreme difficulty of preserving the specimens alive. This difficulty almost amounts to an impossibility. The fungi under study may be present one day and all gone the next; a few drops of extra moisture or a slight current of dry air is sufficient to destroy or collapse the whole lot. Besides this, myriads of other parasitic fungi, and whole tribes of infusoria commonly make their appearance and prey upon the material that is desired to be preserved.

Now one of the most extraordinary facts about the recent potato investigations in this country is this. These other fungi and infusoria have not to any damaging extent appeared. Since I opened my sealed bottles last April, I have kept the material under a bell-glass, and there has been no offensive odour, and to no appreciable extent have there been any moulds, infusoria, or parasites except *Peronospora infestans* itself, and the other fungus which is equally destructive to potatoes, and known under *Fusisporium Solani*. Mr. Broome's material has in the same manner been free from an excessive number of other fungi and infusoria. In investigating the potato disease it was almost as important to discover the entire life-history of the *Fusisporium* as the *Peronospora*, and fortunately the materials preserved gave a perfect clue to the entire life-history of both.

The germination of the resting-spores was awaited with the greatest anxiety, and as I never knew from one day to another whether or not these bodies might all collapse and perish, I was under the necessity of dividing the material, and keeping a constant look-out for results under different conditions. With this object in view, therefore, I kept some of the bodies moist in pure water,

others in diluted expressed juice of horse dung, others in expressed juice of fresh potato leaves, others upon extremely thin slices of potato and on crushed potato mash, others in saccharine fluid, others in nitrogen gas, some between pieces of glass kept constantly moist, some upon broken tile (also kept constantly moist), and some upon potato leaves as they grew upon the living plant. Besides this I have had a quarter of a hundred of slices, kept damp, and under examination every day (almost night and day) for the last three months. All these preparations I have kept constantly and uniformly moist under darkened bell-glasses, for darkness invariably assists the growth of spores of all sorts.

The first new fact worthy of note is this: many of the resting-spores grew in size during nine months of their rest to twice their original diameter, or about four times their original bulk, and their aspect gradually changed from almost smooth, semi-transparent bladders to brown, more or less rough and warted or echinulate spheres. These latter brown mature bodies were quite the same in character with those so sparingly seen last June and July. How they arose last year no one saw, but probably the wet weather of the early summer caused their appearance. It does not follow, because the resting-spores have taken a year to artificially mature with me, that therefore they always take a year to ripen; it is quite possible that, in a state of nature and under different conditions, they may mature rapidly. At any rate, two sorts of bodies were seen together last year, transparent smooth bodies, and rough brown ones. I considered them to be different states of the same resting-spores, and subsequent facts have proved my supposition to be quite correct.

The top row of illustrations on Fig. 12 shows characteristic conditions of the almost mature reproductive bodies as drawn in April last. At *a* is seen the oospore (or resting-spore) within the oogonium (bladder which holds the resting-spore), at *b* may be seen two resting-spores within one oogonium, and at *c* three resting-spores within one oogonium, whilst at *d* is shown a double oogonium—two oogonia coalesced, and each oogonium containing a resting spore.

At the end of April and beginning of May last I began to see the first signs of germination, and at this time many of the oospores proved effete; the oogonium cracked at *e*, or became broken into atoms, as at *f*, discharging a bladder, as at *g*, which perished in fine dust, as at *h*.

As the month of May progressed many of the resting-spores became dense and dark, with the oospore occupying the whole of the oogonium, as at *i*; this condition is different from that of the body *a*, for in this the resting-spore, being not quite mature, does not yet occupy all the oogonium, but floats within from side to side, as the object happens to be moved under the microscope. *j* shows the contents of oospore being broken up into zoospores; *k*

shows the zoospores within still more clearly, and where they are giving an echinulate appearance to the bladder within (an appearance adverted to lately by Mr. Berkeley in a letter to the *Gardeners' Chronicle*); *L* shows the bladder from within the oospore being discharged from the oogonium after the manner of *Cystopus*, with the contained zoospores; this bladder frequently breaks up into dust, as at *M*, setting the zoospores which are at present quiescent free, as at *N*; two tails shortly appear on these latter bodies, and at a certain period of their growth the anterior cilium, or tail, is pushed straight out, as seen at *O*, the posterior tail then quivers with an undulatory movement, and the zoospores sail out of the field of the microscope. How long the zoospores live it is difficult to say, but probably somewhere between twelve hours and a week; at length they come to rest, as at *P*, when the tails fall into fine dust. Some zoospores burst, and at once perish, as at *Q*, whilst others throw out threads of mycelium, *R*, which threads are destined at length to bear the conidiophores of the potato fungus in its new generation. The zoospores thus obtained were planted on the foliage, and upon thin slices of potato supplied from a frame by Mr. Alfred Smee. On these materials they at once produced mycelium and small conidiophores, which, without doubt, belonged to *Peronospora*, but as better results were afterwards obtained from resting-spores similar to *r*, Fig. 12, the figures are not here engraved.

The Rev. J. E. Vize, Forden Vicarage, Welshpool, a gentleman who has made a special study of microscopic fungi, has had some of my living material under examination during the past winter and spring, and when the first signs of germination showed themselves in my oospores, I wrote him to keep a good look-out for results. He wrote me as follows, under date of April 21:—“My idea certainly is that the oospores are germinating; bottle No. 1 had a thin film on it which developed into a lot of mycelium and threads of *Peronospora* ;” I, too, observed the same fact in London.

Throughout May the habit of the oospores appeared to remarkably change, for instead of producing zoospores they protruded a thick and generally jointed thread, this thread agreeing exactly in size with average *Peronospora infestans* thread. On May 13 I observed on the preparations treated with expressed juice of horse-dung threads similar to the very long branched thread shown at *s*, *s*, *s*, Fig. 12; these threads were so long that they traversed the entire slide, and I could only detect a single septum or joint, and frequently none. *t*, *u*, *v*, are characteristic: the latter show two septa, which is a common condition at this stage of growth; and all three figures show the protoplasm of the oospore coiled up within the walls of the latter. *w* shows an oospore germinating with the antheridium (*A*) attached to the oogonium, and still upon its last year's thread; *x* is a germinating oospore with a

thread showing the first septum; and *y* shows two germinating oospores emerging from one oogonium, each thread showing the first septum; the old male organ (antheridium) is still attached to *w*, *x*, and *y*. The figure at *z*, drawn on May 12, is characteristic, and shows three septa; the specimen was sent on to the Rev. M. J. Berkeley, who replied: "I found the germinating oospore exactly as you figure it. There can be no doubt about the matter." Mr. Broome, who was examining similar material of his own, wrote on May 4: "It only remains now apparently to see the *Peronospora* arising from the threads which proceed from the oogonia to prove the identity;" and again on May 20: "I do not see any attached conidia, but the space between the sections of potato is covered with long threads resembling the conidiophorous threads, but I could not see any with the spores on them." It may be said here that no other known fungus has conidiophorous threads similar to those of the potato fungus.

At the beginning of May, whilst observing the habit of *Fusisporium* and its resting state, I observed typical *Peronospora infestans* growing upon the drier parts of the previous year's crushed and decayed leaves; this observation was confirmed by Mr. Vize, who wrote on May 22: "According to my examination the *Peronospora* grows on the drier parts of the magma. I do not observe it growing on the very wet."

On Fig. 13 may be seen a collection of resting spores before and in the act of germination, together with a number of *Perinospora* threads taken from potato leaves and tubers previously infected with the oospores. *A*, *B*, *C*, and *D* show oospores in which the protoplasm which is destined to produce the new plant is coiled up within. At *E* this coil is seen just emerging. This convolute mass is really contained within a thin bladder, and sometimes the bladder is expelled, as in *Cystopus*, from the oogonium before the coil unwinds, as at *F*, *G*. The thread then emerges, as shown at *H*, *I*, and *J*, sometimes leaving the bladder free but broken, as at *K*, *L*. It is rare to see the thread of the new plant in connection with the oogonium, as at *M*, *N*, though I have so seen it, together with the septa many times. The first mycelium or spawn of the new plant is seen at *O*, *O*, *O*, and from this the *Peronospora* springs direct (when artificially grown) almost invariably in a terminal manner. The conidia are not mature in any of the specimens here figured; doubtless this is because all the plants are more or less abnormal from being grown artificially, but still the threads are characteristic of *Peronospora infestans*, and no known fungus but the one which causes the potato disease has vesicular swellings such as are shown at *P*.

Mr. Chas. B. Plowright (surgeon, of King's Lynn), a gentleman who has long studied fungi, has patiently examined some of the living material with which I have been working this spring and early summer, and he writes me on May 19 to say: "I find plenty

of branching, nodose conidiophores, especially amongst the drier portions of the substance sent. I also see living conidia. I have seen many conidiophores with convoluted bases, but in the vast majority of cases long ere the conidia come the oospore is gone; I see the granular protoplasm distinctly ascending the base of the conidiophore." As regards the first coil of mycelium, Mr. Plowright writes: "I distinctly saw this curved in two oospores, and I believe the mycelium comes out with a curl." The same gentleman, under date May 19, writes: "I saw a great many conidiophores both with conidia *in situ* and not; most conidia had fallen off; latterly I saw plenty of convoluted bases." The evidence of identity appears complete, and many of the figures here published, and others not published, have been confirmed by Messrs. Vize and Plowright.

At q on Fig. 13 may be seen *Peronospora* mycelium with a young plant ( $q^1$ ) growing from amongst the starch of the potato tuber, the dark back ground showing the cell wall corroded by the fungus, and at r a similar fragment of mycelium upon the cuticle of a potato leaf; it is very common to see one cell of the cuticle thus discoloured by the corrosive mycelium, the corrosion of the cell being caused by the mycelium passing over and upon it. Both threads here shown come direct from last year's resting-spores. At s is engraved a branch of the potato fungus, showing the numerous partitions with which the threads are at times furnished, and at t is a typical well-grown branch of the fungus, with a full-grown conidium at the apex; this conidium may either discharge zoospores, as at u, or an irregular mass of protoplasm, as at v, from either of which a new plant may spring, and in this habit the conidium agrees well with the resting-spore: the branch in this figure is shown as continuous, and though furnished with the vesicular swellings no partitions are present, the branches are frequently so seen. At w is illustrated a small weak plant, giving rise to a branch, which branch is developing into a large and strong plant; such a phenomenon is by no means uncommon, and shows how the fungus increases itself in every possible way, and may, at times, be proliferous. I have frequently seen this secondary robust thread branched.

During the last hours of completing this, the last engraving (Fig. 13) illustrative of the potato fungus, a new and curious fact came to light. On examining the oospores in saccharine fluid, I observed some of the discharged bladders to be carrying from two to four secondary bladders inside (x); these secondary bodies were in their turn expelled, and grew and produced mycelium as at y, y, y, whilst a few of the same secondary bladders burst and produced from three to six very small zoospores, generally only three. It is a most singular fact that these secondary bladders and zoospores are exactly the same in size with De Bary's *Pythium vexans*, and about one-sixth or eighth of the bulk of the resting-

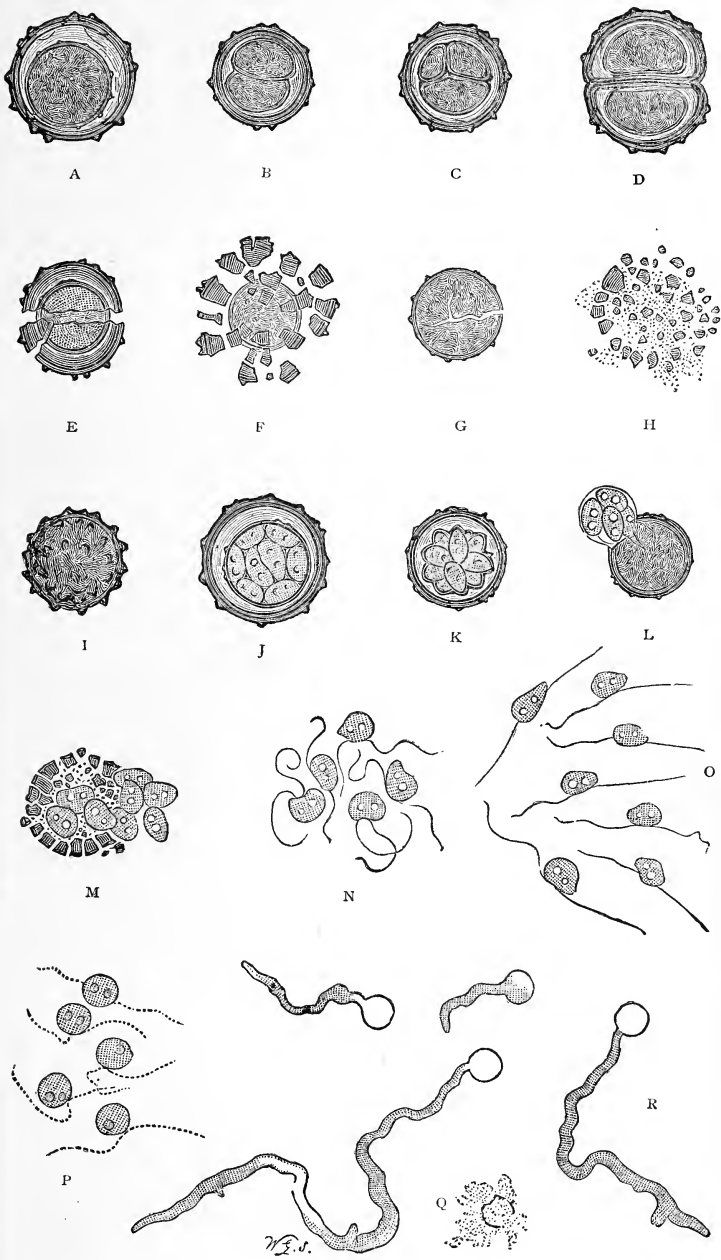
spores from which they were discharged. With this exception there has not been the slightest approach in any of my material to organisms which might be referred to *Pythium*. Mr. Plowright writes: "None of my oospores ever burst and produced *Pythium* or *Pythium*-like spores."

My material has contained a large number of dead mites and aphides and a few nematoid worms; the oogonia and threads were to be seen in all parts of the dead insects, but not in the worms.

De Bary, in reviewing my observation, says:—"Even if the often mentioned warty bodies were hibernating oospores of *Phytophthora* (*Peronospora*), like the similar oospores of *P. Arenaria* which resemble them, we should not gain much information bearing upon these questions, since their occurrence is, at the best, extraordinarily rare." This sentence is very erroneous, for although the bodies were apparently rare when I first recorded their discovery, they were not necessarily so in a state of nature, for on continuing the experiments after my first essay was written, the resting-spores were produced in myriads, and that, too, within the tissues of a comparatively few leaves. During the present spring I have sent mounted preparations of the mature (or almost mature) resting spores to many of the foremost cryptogamic botanists of Europe, but not one has denied their possible identity with *Peronospora infestans*.

For more than thirty years our potato crops have been systematically destroyed by two virulent fungi, viz., *Peronospora infestans* and *Fusisporium Solani*; these two parasites almost invariably work in company with each other, they suddenly appear for a few weeks, destroy our crops, and vanish for ten or twelve months, then reappear and repeat the work of destruction. I claim for my work that it is new, and that it has proved how both these fungi hide and sleep through eleven months of the year. As I have kept the resting-spores of both parasites alive artificially in decayed potato leaves in water, in moist air, and in expressed diluted juice of horse-dung, it conclusively proves to me that the resting-spores hibernate naturally in the same manner. The seat of danger from both parasites is clearly in dung heaps, ditch sides, and decaying potato plants.

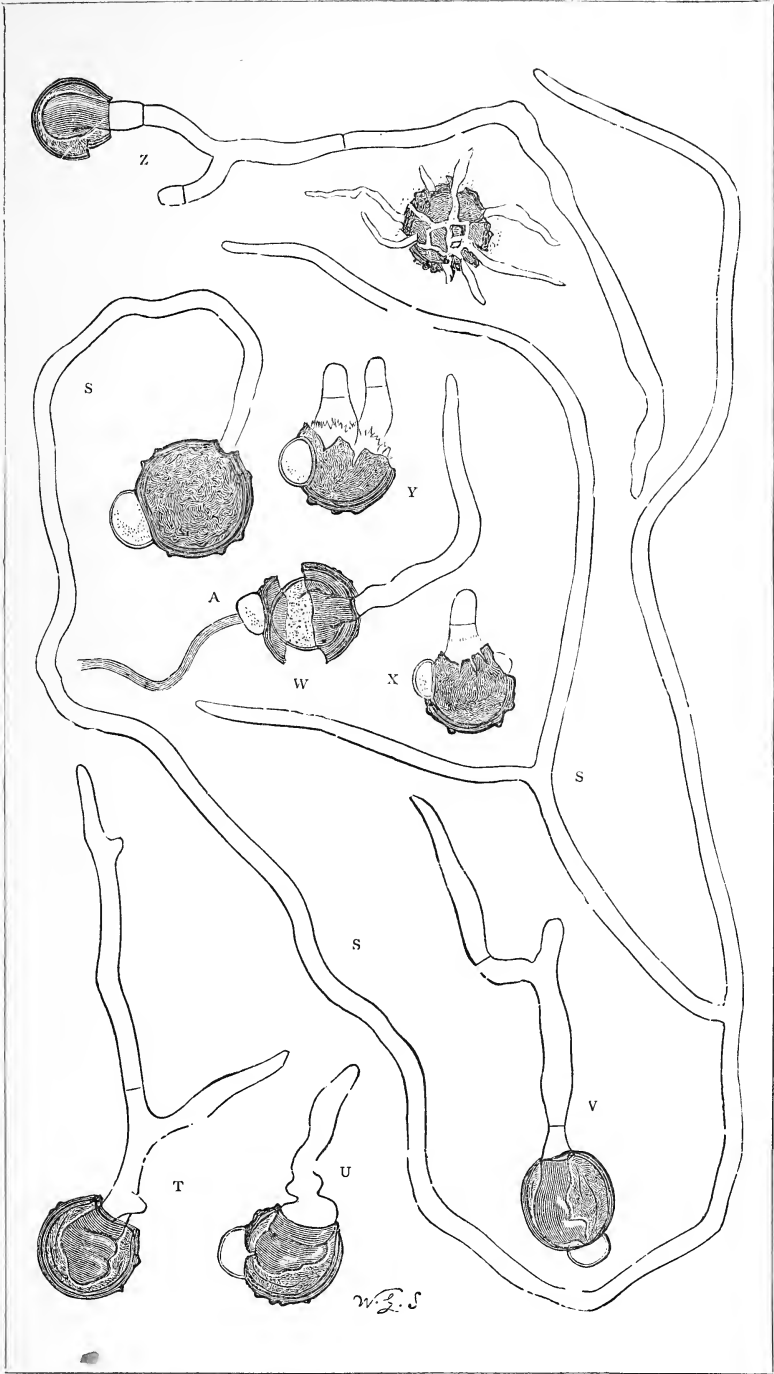
Any method of destroying the resting-spores of these pests, or of warding off or mitigating their attacks, obviously depends in a great measure upon a full knowledge of their life-history. That life-history I have endeavoured to the best of my ability to watch and describe for the *Gardeners' Chronicle*, and I am content to let the observations stand on their own merits. Sensibly conducted and extensive field experiments might probably teach some valuable lessons, but it is difficult, if not impossible, for any single individual, whether farmer or botanist, to institute and carry out such experiments.—*Gardeners' Chronicle*, pp. 39-42, 1876.



Resting-spores of Potato Fungus. (Enlarged 400 diam.)

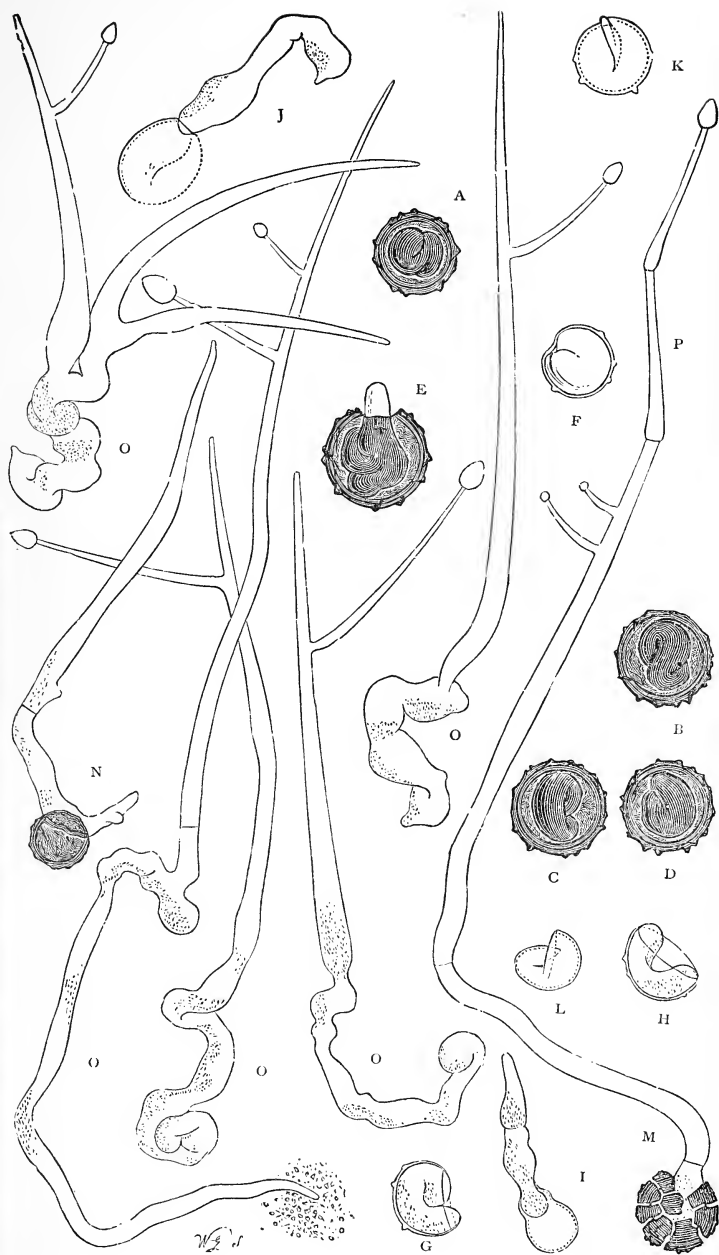






Resting-spores of Potato Fungus. (Enlarged 400 diam.)





Resting-spores of Potato Fungus. (Enlarged 400 diam.)





Resting-spores of Potato Fungus. (Enlarged 400 diam.)



## NEW BRITISH LICHENS.

Communicated by THE REV. J. M. CROMBIE, F.L.S.

The following very considerable list of novelties has since my last notice in "*Grevillea*" been recorded by Nylander in the "*Flora*" for 1876, No. 15, pp. 231-239, and No. 20 pp. 305-311—all of which, with one or two exceptions, have been detected by the researches of Mr. Larbalestier in the hitherto unexplored but evidently most productive district of Galway in N.W. Ireland, which, from its situation and physical features, may be expected in the future to yield a still larger number of rare or new species.

1. **Collema hypergenum.** *Nyl.*—Almost similar to *C. melaenum*, but with larger spores (0,026-36 m.m. long, 0,010-16 m.m. thick), and consequently entitled to rank at least as a subspecies.

On rocks. Connemara, Galway (Larbalestier).

2. **Lecanora subluta.** *Nyl.*—Thallus whitish, thin, minutely granulate, indeterminate (K—); apothecia pale-yellow or sublivid-yellow, crowded, deformed through mutual pressure, the thalline margin subcrenate; spores 8-næ, ellipsoid, 0,010-12 m.m. long, 0,005-6 m.m. thick; paraphyses not very distinct; hymenial gelatine bluish and then wine-reddish with iodine.

var. **perspersa**, *Nyl.*—Apothecia scattered, distant, with no thallus visible between them.

On dry calcareous rocks. Kylemore, Galway (Larbalestier).

Belongs apparently to the section of *L. galactina*, but the spermatogones have not been detected.

3. **Lecanora bæomma.** *Nyl.*—Thallus yellowish-white, opaque, thin, unequal (K yellow); apothecia pale-red, with epithalline or white thickish thalline margin, subanguloso-deformed, scattered; spores 8-næ, colourless, oblong, 1-septate, 0,012-18 m.m. long, 0,004-6 m.m. thick; paraphyses slender, interspersed at the apices; hymenial gelatine bluish and then tawny wine-coloured or wine-reddish with iodine.

On moist micaceous rocks, at Kylemore, Galway (Larbalestier).

4. **Pertusaria concreta.** *Nyl.*—Thallus white or whitish, continuous, thickish, rimose, unequal (K +); apothecia immersed, endocarpoid, colourless, externally indicated by a dark or variable (not dark) punctiform ostiole; spores 2-næ, 0,015-0,550 m.m. long, 0,052-0,080 m.m. thick; hymenial gelatine scarcely coloured with iodine, but the thecæ intensely bluish.

On moist micaceous rocks. Kylemore, Galway (Larbalestier).

Formerly gathered only in Newfoundland\* (*Nyl. Enum.* p. 117),

\* No doubt other North American lichens (maritime) will be detected on the north-west shores of Ireland, as may *à priori* be inferred on geological grounds.—J. M. C.

and in the East Pyrenees (Nyl. Pyr. Or. p. 35, s.n. *P. Westringii*).

5. **Lecidea semipallens.** *Nyl.*—Thallus sordid-white or whitish-glaucous, thin, rimulose; apothecia livid and partly pale, convex, immarginate, colourless within; spores 8-næ, shortly ellipsoid, minute, 0,006-9 m.m., 0,0035-45 m.m. thick; epithecium and hypothecium colourless, paraphyses not discrete; hymenial gelatine wine tawny-reddish, coloured with iodine.

On quartzose rocks. Connemara, Galway (Larbalestier).

6. **Lecidea albocarnea.** *Nyl.*—Thallus whitish, thin, at length rimuloso-diffract; apothecia pale flesh-coloured, convex, immarginate, colourless (white) within; spores 8-næ, colourless, oblong, simple (or obsoletely 1-septate), 0,009-0,014 m.m., 6,0050-0,0035 m.m.; paraphyses slender, not very discrete, epithecium and hypothecium colourless; hymenial gelatine bluish, and then wine-red with iodine.

On quartzose rocks. Connemara, Galway (Larbalestier).

Belongs probably to the section of *L. lævigata*, but no spermogones are visible

7. **Lecidea prærimata.** *Nyl.*—Thallus white or whitish, continuous, rimose, the rimæ subareolate or subparallelly radiating, interspersed with convex or confluent soredia; apothecia brown, biatorine, superficial, but not seen rightly developed.

Perhaps a sub-species of *L. coarctata*, with which it agrees in the thalline reaction.

On felspathic rocks. Jersey (Larbalestier).

8. **Lecidea accesitans.** *Nyl.*—Thallus whitish, subsmooth, dispersed or evanescent; apothecia testaceous or testaceo-brownish, convex, immarginate, whitish within; spores 8-næ, colourless, oblong, simple, 0,009-0,012 m.m. long, 0,0034 m.m. thick; paraphyses not discrete, epithecium and hypothecium colourless; hymenial gelatine, bluish, and then wine-reddish with iodine.

On micaceous schist. Connemara, Galway (Larbalestier).

Belongs apparently to the section of *L. vernalis*. Spermogones with arcuate thin spermatia, 0,014-19 m.m. long, 0,0005 m.m. thick.

9. **Lecidea carneo-albens.** *Nyl.*—Thallus glaucous-green, thin, granulose, indeterminate; apothecia white flesh-coloured, convex, immarginate, colourless within; spores 8-næ, bacillar, substraight, 3-5 septate, 0,023-27 m.m. long, 0,0025-0,0035 m.m.; paraphyses not discrete, epithecium and hypothecium colourless; hymenial gelatine tawny wine-reddish (the apices of the thecæ at first bluish) with iodine.

On siliceous stones of a rivulet. Connemara, Galway (Larbalestier).

The apothecia are sometimes sublivid.

10. **Lecidea submœstula.** *Nyl.*—Thallus greyish, minutely sub-



verrucoso-granulose or subdispersed; apothecia black, convex, immarginate, often 2 or more connated, concolorous within; spores 8-næ, colourless, ellipsoid, simple, 0,006-0,010 m.m. long, 0,0035 m.m. thick; paraphyses not distinct; epithecium somewhat greenish-black; hypothecium thick, brown; hymenial gelatine bluish, and then tawny wine-coloured with iodine.

On dry sandstone rocks. Connemara, Galway (Larbalestier).

**11. *Lecidea subconfusa*.** *Nyl.*—Thallus dark greyish above, thinly granulato-concrescent; apothecia black, convex, colourless within; spores 8-næ, colourless, ellipsoid, simple, 0,007-8 m.m. long, about 0,0035 m.m. thick; paraphyses thickish, not very distinct; epithecium bluish-infusate; hymenial gelatine at first bluish, and then wine-reddish with iodine.

On siliceous rocks. Connemara, Galway (Larbalestier), but formerly gathered in Stroemoe, Faroe (Rostrup).

Differs from *L. fuliginosa*, Tayl., in the colour of the thallus and the rather smaller spores.

**12. *Lecidea nigrificans*.** *Nyl.*—Thallus blackish, opaque, thin, rugulose, areolato-rimose; apothecia black, plane, subprominent, margined, whitish within; spores 8-næ, colourless, ellipsoid, simple, 0,011-12 m.m. long, 0,0067 m.m. thick; epithecium greenish-black; paraphyses distinct, moderate; hypothecium colourless; hymenial gelatine wine-reddish with iodine.

On dry argillaceous schistose rocks. Connemara, Galway (Larbalestier).

Belongs probably to the section of *L. confusula*, *Nyl.* The thallus is entirely green within, and the margin of the apothecia is sometimes cæcio-suffused.

**13. *Lecidea baliola*.** *Nyl.*—Thallus ochraceous-brown, or leaden-ochraceous, thin, smooth, rimulose; apothecia black, plane, subprominent, margined, concolorous within; spores 8-næ, colourless, oblong, simple, 0,008-9 m.m. long, 0,002-3 m.m. thick; paraphyses not distinct; epithecium and hypothecium brown; hymenial gelatine bluish and then wine-red with iodine.

On siliceous rocks of a stream, associated with *Lecanora lucustris*. Connemara, Galway (Larbalestier).

Belongs to the section of *L. expansa*.

**14. *Lecidea dilutiuscula*.** *Nyl.*—This agrees nearly with *L. infidula*, *Nyl.*, but the apothecia are livid or livid-pale, and entirely pale within. Spores ellipsoid, 0,007-0,010 m.m. long, 0,004-6 m.m. thick; epithecium and hypothecium colourless.

On schistose maritime rocks. Originally gathered several years ago in Devonshire (Dr. Holl), and again more recently at Connemara (Larbalestier).

**15. *Lecidea umbrinella*.** *Nyl.*—Thallus umbrine-brown, thin, subrugulose, rimulose; apothecia somewhat prominent, plane, submargined, whitish within; spores fusiform, simple or 1-septate,

0,008-0,014 m.m. long, 0,002-3 m.m. thick; paraphyses brown-clavate at the apices; epithecium and perithecium brown; hymenial gelatine, at first bluish and then wine-reddish with iodine.

On micaceous rocks. Connemara (Larbalestier).

Nearest to *L. prominula*, Borr., but with thinner thallus and different reaction with iodine.

16. ***Lecidea tenebrans***. *Nyl.*—Similar to *L. contigua*, but with thallus leaden-greyish or dark leaden-coloured (medulla I. partly bluish), and the hymenial gelatine with the thecæ persistently intensely bluish. Spores 0,018-24 m.m. long, 0,010-13 m.m. thick.

On micaceous schist. Connemara (Larbalestier).

Probably a subspecies of *L. contigua*.

17. ***Lecidea subumbonata***. *Nyl.*—Thallus white, subopaque, thin, unequal; apothecia black, opaque, plane, umbonate in the centre, margined, concolorous within, and often as if divided into several hymenia; spores 8-næ, colourless, oblongo-ellipsoid, simple, 0,016-22 m.m. long, 0,007-9 m.m. thick; paraphyses not very distinct, epithecium and hypothecium brown; hymenial gelatine bluish with iodine, and then the thecæ tawny wine reddish; spermatia cylindrical (or obsoletely fusiformi-cylindrical), 0,004-7 m.m. long, 0,000 m.m. thick.

On micaceous rocks. Connemara (Larbalestier).

Belongs to the section of *Lecidea jurana*, Schær.

18. ***Lecidea pedatula***. *Nyl.*—Thallus whitish, granulose, thin (K yellow); apothecia black, minute, convex, immarginate, attenuato-stipitate; spores not seen rightly developed, thin section of hymenium bluish, epithecium rather dark, the stipitiform hypothecium reddish; hymenial gelatine faintly bluish with iodine.

On rocks, upon *Sirosiphon saxicola*. N.W. Ireland (Larbalestier).

Approaches in habit towards *L. neglecta*.

19. ***Lecidea parellaria***. *Nyl.*—Allied to *L. parasitica*, Flk., but with the spores 1-septate (much more rarely 3 septate), and the paraphyses blackish-clavate at the apices. Parasitic on the thallus of *Lecanora parella*.

Ireland (Larbalestier), formerly gathered in France (Nylander), and I believe I have seen the same in S.W. England.

20. ***Arthonia Hibernica***. *Nyl.*—Perhaps a subspecies of *A. excipienda*, from which it chiefly and constantly differs in the larger spores, which are 0,016-21 m.m. long, 0,006-8 m.m. thick.

On smooth bark of trees. S.W. and N.W. Ireland (Carroll and Larbalestier).

21. ***Graphis petrina***. *Nyl.*—Thallus scarcely any visible; apothecia black, linear, simple, subflexuose; epithecium rimiform, narrow, and the margin tumid, on either side at least once sulcated, thence the lirellæ are sulcated, the sulci being often

white-suffused; spores 8-næ, brownish, 8-12 locular, 0,036-50 m.m. long, 0,007-0,011 m.m. thick; hypothecium black.

On moist micaceous rocks. *Connemara* (Larbalestier).

22. ***Verrucaria aquilella***. *Nyl.*—Thallus lurid brown or sub-aquileous, minutely areolate or areolato-granulated, thin; apothecia with the pyrenium dimidiately black, denudate, rugulose; spores 8-næ, ellipsoid, simple, 0,018-22 m.m. long, 0,007-9 m.m. thick.

On micaceous rocks. *Connemara* (Larbalestier).

Differs at once from *V. umbrinula*, *Nyl.*, in having the thallus firmer and not subleprose.

23. ***Verrucaria leptaleella***. *Nyl.*—Subsimilar to *V. leptalea* (Mnt.), but with thallus greenish, very thin, subleprose; spores thinner, 0,016-20 m.m. long, 0,0025-0,0030 m.m. thick.

On the bark of trees. *Connemara* (Larbalestier).

24. ***Verrucaria tenuifera***. *Nyl.*—Sufficiently similar to *V. chlorotica*, with thallus thin, greyish, rimulose (gonidia subchroolepoid); apothecia small, pyrenium dimidiately black, convex; spores bacilliform, 3-septate, 0,029-33 m.m. long, 0,0035 m.m. thick.

On quartzose rocks. *Jersey* (Larbalestier).

25. ***Verrucaria fusco-cinerascens***. *Nyl.*—Thallus greyish-brown, areolato-rimose, unæqual, thin; apothecia with the pyrenium entirely black, the half of the upper portion denudate, convex; spores 8-næ, oblong, 0,022-27 m.m. long, 0,008-0,010 m.m. thick.

On micaceous rocks. *Connemara* (Larbalestier). Allied to *V. fusco-nigrescens*.

26. ***Verrucaria holochrodes***. *Nyl.*—Sufficiently similar to *V. lectissima*, and probably a subspecies of it, differing especially in the ochraceo-reddish, thin, continuous, indeterminate thallus. Spores fusiform, 3-septate, 0,023-34 m.m. long, 0,005 6 m.m. thick.

On shady slaty rocks. *Connemara* (Larbalestier).

27. ***Melanotheca ischnobela***. *Nyl.*—Thallus glaucous-whitish, macular; apothecia black, convex, rotundate or suboblong, pyrenium dimidiate, black, 2-4 hymenia collectively in each apothecium, the hymenia contiguous, obliquely situated and confluent at the apices, ostiole scarcely any; spores 8-næ, colourless, very thinly acicular, 0,060-0,115 m.m. long, about 0,001 m.m. thick, thecæ cylindrical, elongated; paraphyses very slender, crowded; hymenial gelatine, not coloured by iodine.

On the bark of holly. Near Kylemore, Galway (Larbalestier).

In addition to these, a few new varieties and forms are also described by Nylander in the above Nos. of the "Flora." These are as follows:—

***Lecidea metamorphea* (\*) *septenaria***. *Nyl.*—Scarcely more than

a variety of *L. metamorphea*, with spores 7-septate, 0,030-34 m.m. long, 0,007-8 m.m.

In-fissures of rocks. Connemara, Galway (Larbalestier).

**Lecidea grisella f. meiosporiza.** *Nyl.*—Thallus whitish or greyish-white, rimoso-diffract; apothecia plane or convex, cæsio-pruinose.

On rocks and boulders. Scotland (Crombie); Ireland (Larbalestier); occurs also in France.

**Arthonia cinnabarina f. cuspidans.** *Nyl.*—Distinguished from the type by the apothecia being scarcely erythrino-se, thinner, the apices of the divisions acuminate; spores smaller, 0,016-19 m.m. long, 0,006-7 m.m. thick.

On the bark of hollies. Ireland (Larbalestier) = Wright Cub. No. 123 *a* & *b*.

**Arthonia sapineti.** *Nyl.* (=Rabenh. Lich. Eur. 575).—Sufficiently similar to *A. atrofuscella*, but differing in the thin section of apothecium, being subincolorous and K— (or obsoletely dark-greenish); spores 0,011-14 m.m. long, 0,006 m.m. thick.

Connemara (Larbalestier), but with thallus macular, greenish.

## NEW JERSEY FUNGI.

By M. C. COOKE and J. B. ELLIS.

(Continued from Vol. IV, p. 180.)

The following were chiefly collected in the neighbourhood of Newfield, New Jersey, by J. B. Ellis, who has already contributed many additions to the Fungi of the United States. The few specimens from Maine are indicated.

2319. **Nectria pulicaris.** *Tul.*—On corn stalks.

2320. **Sphæria millegrana.** *Schwz.*—On oak chip.

2321. **Nectria coccinea.** *Fr.*—On *Magnolia*.

2294. **Hendersonia collapsa.** *C. & Ellis.*

Peritheciis sparsis, globosis, demum collapsis, cupulæformis, atris, erumpentibus; sporis fusiformibus, triseptatis, hyalinis.

On maple twigs.

Spores  $0.25 \times 0.005$ , hyaline, triseptate, pointed at each end. Perithecia rather large, elevated, soon collapsed, and resembling a black *Peziza* (pl. 75, fig. 12).

2322. **Peziza (Dasyscypha) lachnoderma.** *Berk.*—See Grevillea, iv, pl. 66, fig. i. — On bark of fir.

2323. **Melanconium ramulorum.** *Corda.*—(*M. bicolor*, var. *ramulorum*.)

On *Magnolia*.

Spores ovate, or subglobose, slightly pointed at the base.

2324. **Sphæria parallela.** *Fries.*—On pine wood.

Sporidia uniseriate, elongated, elliptic, brown.

2325. **Valsa albofusca.** *C. & Ellis.*

Parva, epidermide tecta; erumpens; peritheciis paucis, ostioliis in disco fusco, primum albus, pulverulento, collectis; ascis arcte clavatis; sporidiis cylindratis, utrinque attenuatis, multinucleatis.

On *Quercus obtusiloba*.

At first, when bursting through the cuticle, masked by a white, mealy pseudo-disc, which soon falls away, and exposes the shining black ostiola, few in number, protruding through a brown disc; sporidia long and narrow,  $.04 \times .005$  m.m., with a row of nuclei (pl. 75, fig. 8).

2326. **Valsa cinctula.** *C. & Pk.* in N. Y. Reports.—On chestnut.

Sporidia  $.05$  m.m. long, curved, hyaline, triseptate when mature. Allied to *V. suffusa*, but the ostiola are distinct, and not united into a common orifice as in that species (pl. 75, fig. 15).

2327. **Valsa, sp.**—On bark of *Viburnum*.

The very minute fragment of this specimen is insufficient for determination. The sporidia are sausage-shaped, hardly mature, in some cases not formed in the ascus. It may be *Valsa mesoleuca*, B. & C.

2328. **Sphæroopsis sumachi.** *C. & E.*—(*Sphæria sumachi*, Schwz. No. 1425.)

On branches of *Rhus glabra*.

Spores elliptic, brown, sometimes with a large globose nucleus,  $.02-.025 \times .012$  m.m. (pl. 75, fig. 11).

2329. **Diatrype hystrix.** *Tode.*—On *Acer rubrum*.

2330. **Nectria cucurbitula.**—On *Nyssa* and *Rhus*.

The asci and sporidia are of two kinds. Small and narrow asci, containing eight narrow, fusiform sporidia. Larger asci containing innumerable minute spermatoid sporidia, not more than  $.003$  m.m. long.

2331. **Calocera cornea.** *Fr.*—On maple.

2332. **Helicosporium olivaceum.** *Peck.*—On rotten wood.

We have not been able to compare this with an original specimen of *Helicosporium vegetum*, Nees, but it accords very well with Corda's figure of that species.

2333. **Diatrype fibrillecta.** *C. & Ellis.*

Pustulis longitudinaliter erumpentibus, subseriatis, ostioliis prominulis exasperata, stromate atrobrunneo; ascis minimis, clavatis; sporidiis allantoides, hyalinis.

On bark of *Juniperus Virginiana*.

The pustules are small and erumpent, girt, or partly covered with the fibres of the fissured bark; the necks are often elongated,

but not so much as in *D. hystrix*. Asci very minute, about .04 m.m. long; sporidia .005 m.m. long.

2335. ***Diatrype collariata*.** *C. & Ellis.*

Pustulis longitudinaliter erumpentibus, sæpe seriatis, maxime elevatis; ostiolis longissimis, cylindraceis, in collaris brunneis congestis; sporidiis allantoideis.

On hickory branches.

Erumpent, in more or less irregular longitudinal lines. Pustules elongated, ostiolar cylindrical, terete, black, shining, bound together in a brown collar, through more than half their length; sporidia profuse, .008-.01 m.m. long. A very characteristic species, unlike any with which we are acquainted.

2337 & 2295. ***Sphæropsis quercina*.** *C. & Ellis.*

Peritheciis in massam communam congestis, erumpentibus, epidermide cinctis; spores magnis hyalinis, ovalibus vel ellipticis, granulis repletis.

On white oak, and yellow oak.

Having very much the appearance of a *Diatrype*. Substance of the perithecia vinous-purple; spores originating on thick pedicels, from subglobose to elliptic, .02-.04  $\times$  .012-.02 m.m., highly refractive.

2338. ***Patellaria rhabarbarina*.** *Berk.*—On *Rubus*.

This is in an immature condition undoubtedly of the above species.

2339. ***Dermatea carnea*.** *C. & Ellis.*

Cœspitosa, minuta, ochraceo-carnea, erumpens; cupulis stipitatis, turbinatis, demum excavatis, extus furfuraceis, pallidiore; ascis clavatis; sporidiis ellipticis, sæpe triseptatis, hyalinis.

On bark of *Acer rubrum*.

Cups  $\frac{1}{4}$ - $\frac{1}{2}$  m.m. broad, 3-4 together, breaking through the bark, ochraceous flesh colour, externally mealy. Allied to *Dermatea pallida*, Cooke, but smaller, more cupulate, and of a different colour. The fruit differs from that of *Dermatea acericola*, Pk., which it also resembles. Breaking through and surrounded by the cuticle; sporidia .02-.022  $\times$  .008 m.m. (Pl. 75, fig. 9.)

2340. ***Peziza rubella*.** *Pers.*—On maple.

2341. ***Diplodia thyoidea*.** *C. & Ellis.*

Peritheciis erumpentibus, subgregariis, globosis, papillatis, atris, nitidis; sporis centro constrictis, cellulis globosis, brunneis.

On bark of *Cupressus thyoides*.

Erumpent, seated amongst the fibres of the bark, when the cuticle is cast off, black, shining, globose; spores strongly constricted, each cell globose, .025-.028  $\times$  .012-.013 m.m.

2342. ***Diatrype dryophila*.** *Curr. var. Minor.*—On *Quercus nigra*.

Sporidia exactly as in the typical form, of which *Diatrype truncata*, Ellis, is a normal condition. Sporidia narrowly elliptic, brown, .012 m.m. long. (Pl. 75, fig. 13.)

2343. **Hypoxylon multiforme** var. **effusum**. *Fr.*—On maple.

2344. **Microthyrium smilacis**. *Not.*—On twigs of *Smilax*.

2345. **Peziza aurelia**. *P.*—On dead leaves.

2346. **Stictis dryophila**. *C. & Ellis*.

Sparsa, pallida, extus pruinosa; margine primum dentatis; disco plano; ascis cylindraceutis; sporidiis cylindricis, obtusis, multinucleatis; paraphysibus filiformibus, copiosis, flexuosis.

On twigs of oak.

The fruit in this species is remarkably fine. Sporidia biseriate, overlapping,  $.18 \times .012$  m.m. long, slightly attenuated towards each end, multinucleate. (Pl. 75, fig. 6.)

2347. **Physarum connatum**. *Ditm.*—On leaves.

2348. **Phoma clypeata**. *C. & Ellis*.

Peritheciis applanatis, papillatis, nigrocinctis, subsparsis; sporis minutis, ellipticis, hyalinis.

On dead wood. Maine (Rev. T. Blake).

Seated on the surface of the wood, flattened at the base, around which is a black stain on the matrix; spores elliptical,  $.006$  m.m. long. (Pl. 75, fig. 10.)

2350. **Helotium herbarum**. *Fr. Cooke, Handbook, No. 2156.*—On herbaceous stems. Maine (Rev. J. Blake).

2351. **Tympanis punctoidea**. *Cooke. Ravenel, No. 1906.*—On bark. Maine (Rev. J. Blake). (Pl. 75, fig. 7.)

2352. **Nectria dispersa**. *C. & Ellis*.

Sparsa, aurantiaca; peritheciis globosis, papillatis, lævibus; ascis cylindraceutis; sporidiis ellipticis, utrinque attenuatis, uniseriatis, uniseptatis; conidiis fusiformibus, curvatis, triseptatis.

On bark. Maine (Rev. T. Blake).

Perithecia widely dispersed; sporidia  $.025 \times .01$  m.m.; conidia  $.05 \times .01$  m.m. (Pl. 75, fig. 14. *a*, conidia.)

2353. **Septosporium velutinum**. *C. & E.*

Effusum, velutinum, atrum; floccis erectis, simplicibus, septatis, atrobrunneis, apice hyalinis; sporis pyriformibus, magnis, multiseptatis, muriformibus, subopacis, breviter stipitatis.

On maple wood.

Effused, forming a black velvety stratum; flocci erect, slender, septate, brown, hyaline at the tips; spores large, pear-shaped, on short pedicels, apparently seated at the base of the flocci, multi-septate, muriform, dark brown,  $.05 \times .025$  m.m. (Pl. 75, fig. 1.)

2354. **Peziza (Cupulares) cerea**. *Sow.*—On the ground, in chip yard.

Although there are some minor points of difference, they are unimportant, and we cannot therefore regard this as other than the above-named species.

2355. **Fusisporium**. *Sp.*—On dead oak limbs.

This small specimen exhibited the threads in great perfection, but

without any fruit. It is doubtless a *Fusisporium*, but could not be referred to any species without recognition of the spores. If the separating cylindrical joints are of the nature of spores, this can hardly belong to the above genus.

2356. *Vermicularia atramentaria*. B. & Br.—On old corn stalks.

With minute hyaline spores. Probably this species, but mostly barren, and without any special distinctive features.

2357. *Dothidea cerasi*. C. & Ellis.

Gregaria, parva; pulvinulis transversale erumpentibus, elongatis, epidermide cinctis, atris, papillatis; ascis clavatis; sporidiis ellipticis, hyalinis.

On cherry twigs.

Scarcely a good *Dothidea*. Cells often approximating to distinct perithecia; sporidia biseriata, hyaline,  $.025 \times .012-.014$  m.m. (Pl. 75, fig. 2.)

2358. *Valsa salicina*. Fr. (?)—On *Nyssa*.

This is probably *Valsa salicina*, but in bad condition; the asci are all absorbed, and the majority of the sporidia in a state of germination. (Pl. 17, fig. 17. Sporidia.)

2359. *Melogramma ambiguum*. Schwz.—On branches of *Rhus*.

The sporidia are larger, and somewhat different in shape from those in specimens derived from Dr. Curtis and H. W. Ravenel, but the habit is similar. Sporidia  $.03-.035 \times .012$  m.m., somewhat naviculoid; asci  $.2$  m.m. long. (Pl. 75, fig. 5.)

2360. *Valsa Liquidambaris*. Schwz.—On *Liquidambar*.

Sporidia sausage-shaped, hyaline,  $.012$  m.m. long. It is difficult in the absence of authentic specimen to affirm that this is the species of Schweinitz, but it accords with specimen from the late Dr. Curtis. (Pl. 75, fig. 16.)

2361. *Dothidea excavata*. C. & Ellis.

Gregaria, discoidea, oblonga, irregularis, depressa, demum concava, atra; ascis cylindraceis; sporidiis uniseriatis, ellipticis, multiseptatis, muriformibus, fuscis.

On *Magnolia glauca*.

Pustules flattened, soon concave, irregular in form and size; sporidia elliptical,  $.018-.02 \times .01$  m.m., muriform, brown. With unusual fruit for a *Dothidea*, resembling that of *Cucurbitaria*, or some species of *Hysterium*. (Pl. 75, fig. 4.)

2362. *Sphæria (Obtectæ) viscosa*. C. & Ellis.

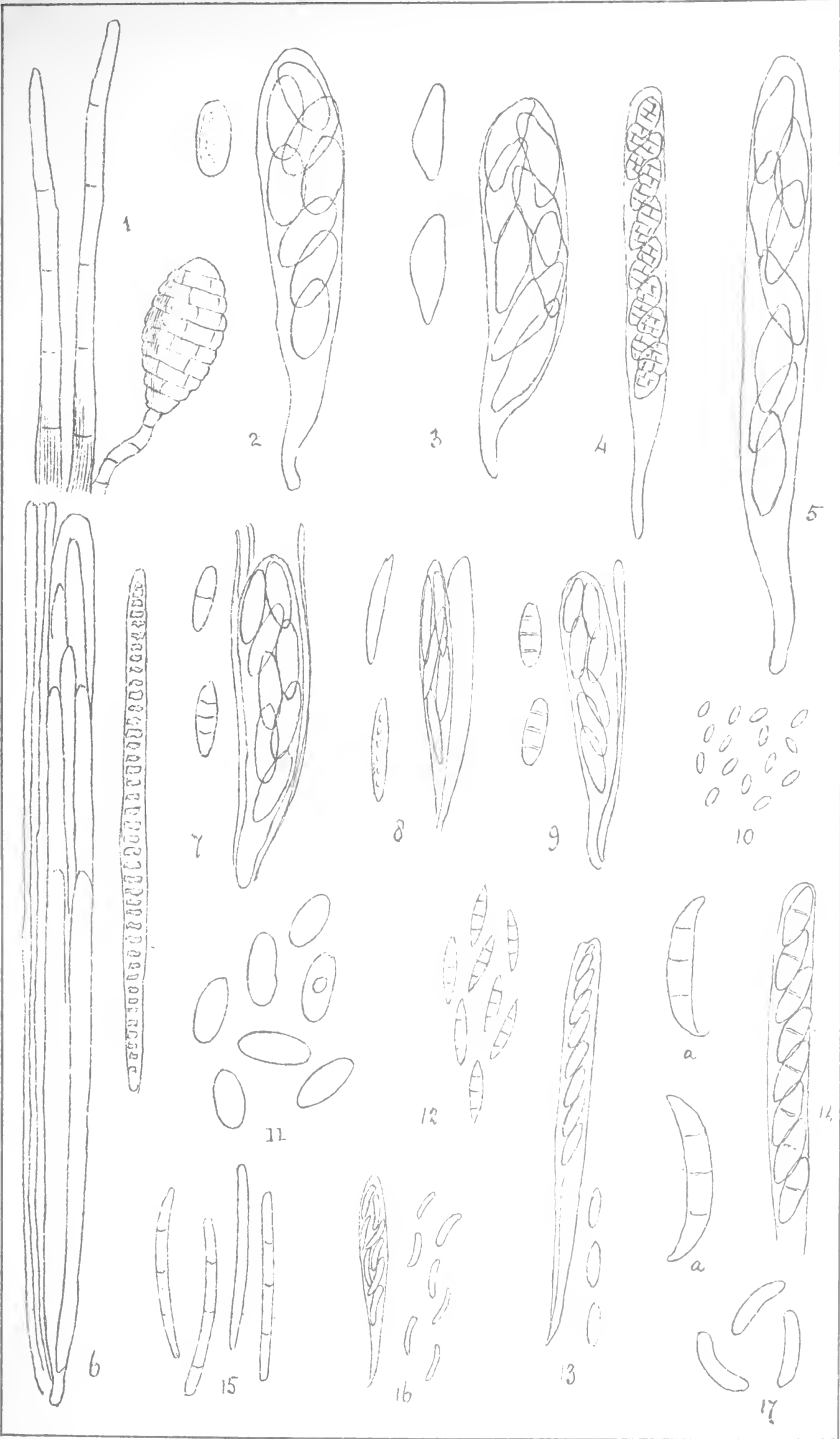
Gregaria. Peritheciis tectis, applanatis, nigris; ostiolo erumpente; ascis clavatis; sporidiis biseriatis, naviculoides, hyalinis.

On *Azalea viscosa*.

Raising the bark a little so as to roughen the twigs, the ostiola only being exposed; asci broadly clavate; sporidia boat-shaped, hyaline,  $.035 \times .01$  m.m. (Pl. 75, fig. 3.)

*Ræstelia botryapites*. Schw. Am. Bor. No. 902 = *Ræstelia Ellisii*, Peck.







The Rev. M. J. Berkeley has convinced himself by comparison of an authentic specimen of Schweinitz's species with *Ræstelia Ellisii*, Pk., that they are identical.

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DESCRIPTION OF PLATE 75.

- Fig. 1. *Septosporium velutinum*, C. & E.  
 " 2. *Dothidea Cerasi*, C. & E.  
 " 3. *Sphæria viscosa*, C. & E.  
 " 4. *Dothidea excavata*, C. & E.  
 " 5. *Melogramma ambiguum*, Schw.  
 " 6. *Stictis dryophila*, C. & E.  
 " 7. *Tympanis punctoidea*, C.  
 " 8. *Valsa albofusca*, C. & E.  
 " 9. *Dermatea carnea*, C. & E.  
 " 10. *Phoma clypeata*, C. & E.  
 " 11. *Sphæropsis Sumachi*, Schw.  
 " 12. *Hendersonia collapsa*, C. & E.  
 " 13. *Diatrype dryophila*, Curr.  
 " 14. *Nectria dispersa*, C. & E. a conidia.  
 " 15. *Valsa cinctula*, C. & Pk.  
 " 16. *Valsa Liquidambaris*, Schw.  
 " 17. *Valsa salicina*, Fr. Sporidia.
- The figures magnified 500 diameters.
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DISCOMYCETES FROM CALIFORNIA.

(Collected by H. W. HARKNESS, M.D.)

By WILLIAM PHILLIPS, F.L.S.

In May last I received a small packet of fungi from Dr. Harkness, of San Francisco, California, consisting chiefly of Discomycetes collected by him in the vicinity of that city. The species are interesting entirely on account of the locality in which they were collected, and their enumeration here should be regarded simply as a small contribution towards our knowledge of the geographical distribution of species. It is the intention of Dr. Harkness to make as complete a collection as lies within his power of the minutest fungi of that part of the Pacific Coast.

*Cyphella capula*, Fr. On dead herbaceous stems. No. 163.

*Peziza vesiculosa*, Bull. On manure heaps. No. 39.

*Peziza badia*, P. On the ground. No. 139.

*Peziza leporina*, Batsch. On the earth. No. 44.

*Peziza subhirsuta*, Schm. On cinder heaps. No. 69.

*Peziza aurantia*, Fr. On garden walks. No. 8 and 67.

*Peziza rutilans*, Fr. On damp walls. No. 55.

*Peziza omphalodes*, Bull. On ashes. No. 46.

*Peziza theleboloides*, A. & S. On cow dung. No. 17.

*Peziza escharodes*, B. & Br. On dead twigs. No. 32.

*Peziza corticalis*, Pers. No. 31.

*Peziza sulphurea*, Pers. On herbaceous stems. No. 167.

*Peziza villosa*, Pers. On herbaceous stems. No. 166.

*Peziza rosæ*, Pers. On decayed briars. No. 11.

*Peziza cyathoidea*, Bull. On dead herbaceous stems. No. 158.

*Peziza cinerea*, Batsch. On dead oak. Nos. 48, 131.

*Peziza elaphines*, B. & Br. On decayed wood. No. 49.

*Helotium virgultorum* (Vahl). On dead wood. Nos. 10, 40.

*Helotium claro flavum*, Grev. On dead wood and bark. Nos. 15, 20, 29, 30, 59, 62, 113.

*Ascobolus furfuraceus*, Pers. On cow dung. No. 2.

*Bulgaria inquinans*, Fr. On dead wood. No. 90.

No. 52 is *Lecidea lutea* (Dicks.)

The following numbers are too imperfect to determine:—26, 53, 98, 105, 132.

No 343 consists of a single cup of a *Peziza* growing on oak bark. It is  $\frac{1}{2}$  in. across, sessile, pale brown, smooth; disc darker; sporidia 8, ovate,  $\cdot 02\text{--}\cdot 025 \times \cdot 013\text{--}\cdot 02$  m.m.m.; paraphyses clavate at the summits. This is probably an undescribed species, but as there is only a single cup it is better to let it remain unnamed for the present. It is unknown to Mr. C. E. Broome, who kindly examined it.

## MEMORANDA.

EHRENBERG.—This veteran died at Berlin on the 27th June, at the advanced age of 82 years.

FÜCKEL.—Leopold Fückel died at Vienna on the 9th May of typhus. His collection of Rhenish Fungi is an excellent one, and he is known also to Mycologists for his "Symbolæ Mycologicæ."

GILLET'S CHAMPIGNONS.—In the notice of this book in "Grevillea" iv, pp. 18 are the following misprints:—

For "plure," read "plures."

For "tectus," read "tectas."

For "descriptus," read "descriptas."

For "granulosa," read "granulosæ."

I add to Fries's remarks—

*Amanita inaurata* is *Agaricus strangulatus*.

*Clitocybe Pelletiera* is clearly *Paxillus* I found last autumn, and which is figured by Kalchbrenner. M. J. Berkeley.

BRITISH FUNGI.—Messrs. Hardwicke and Bogue are preparing for publication, early in September, the *third* edition of "Cooke's Plain and Easy Account of British Fungi," revised and corrected, with the majority of plates re-drawn. The price will remain at six shillings, the same as before.

REHM'S ASCOMYCETEN.—The 7th fasciculus is just published, and contains, as usual, some interesting species. Amongst these is *Peziza Ellisiana*, but we must confess that we cannot trace any material difference between this and *Peziza subtilissima*, C.; the sporidia, however, seem to be scarcely mature. It may, perhaps, be an immature condition of *Peziza lachnoderma*, Berks. We cannot help deprecating the rage for new names, without reason, of which we have an example in No. 325. This is the *Sphaeria* (*Diatrype*) *quadrata*, Schwein., and here it appears under the name of *Myrmecium obesum*. Undoubtedly specimens were distributed by the late Dr. Curtis as *Diatrype obesa*, Berk. & Curt.; but why *Myrmecium*? We may expect very soon that each species will become the type of its own genus. This unfortunate *Sphaeria* has a multitude of aliases already. It is the *Diatrype exasperans*, Gerard; the *Diatrype brunnea*, C. & Pk.; the *Diatrype obesa*, Berk. & Curt.; and primarily, the *Sphaeria* or *Diatrype quadrata*, Schweinitz. If any alteration in the generic name should really be desirable, the specific name *quadrata* of Schweinitz has priority. If it is the object of the new school of continental mycologists to ignore and obliterate such respected and honoured names as those of Schweinitz, Persoon, and others, they are taking the right steps to accomplish their object—for a time—until reason and science again united reign.

N.B.—Since writing the above Mr. Phillips informs us that he has succeeded in finding mature sporidia in one of the cups of *Peziza Ellisiana* as published by Rehm, and that they accord perfectly with those of *Peziza lachnoderma*, Berk.

LICHENS.—We have before us two papers containing descriptions of new Foreign Lichens by Dr. Stirton. There is also an enumeration of small collections of known species from Kumaon (India), Calcutta, Ceylon, Isle of Mauritius, South Africa, and the collection made by Mr. Trail in the Amazons. No British species are included in these papers.

MYCOGRAPHIA.—It is proposed to issue the Third Part of "Mycographia" as early as possible in October of the present year. The fourth part will not be ready before March or April in next year.

PHILADELPHIA EXHIBITION.—The "Department of Agriculture" exhibits 200 coloured illustrations of the Genera of Fungi, from drawings undertaken for the Department by Dr. M. C. Cooke. The selection includes the most important and typical genera, with microscopical dissections, drawn to an uniform scale.

GREVILLEA.—The present number commences the fifth volume, subscriptions for which have fallen due, and should be paid as heretofore.

## FUNGI BRITANNICI EXSICCATI.

## SERIES I. AND II.

The following enumeration of the species published up to the present time in the two series of Fungi Britannici, is printed at the request of several correspondents. The numbers in the first column are those of the first series, and those in the second column of the second series, of which five centuries have been issued.

|   | Ser. I. | Ser. II. |
|---|---------|----------|
| <i>Acrospermum graminum</i> , <i>Tode.</i>              |         | 480      |
| <i>Actinothyrium graminis</i> , <i>Kze.</i>             | . 338   |          |
| <i>Æcidium albescens</i> , <i>Grev.</i>                 | . 636   | 78       |
| <i>Æcidium allii</i> , <i>Grev.</i>                     | . 16    |          |
| <i>Æcidium ari</i> , <i>B.</i>                          | . 534   | 84       |
| <i>Æcidium asperifolia</i> , <i>P.</i>                  | . 325   |          |
| <i>Æcidium aviculare</i> , <i>Kze.</i>                  | .       | 312      |
| <i>Æcidium behenis</i> , <i>DC.</i>                     | . 442   |          |
| <i>Æcidium berberidis</i> , <i>P.</i>                   | . 441   | 93       |
| <i>Æcidium compositarum</i> v. <i>Bellidis</i>          | . 327   | 90       |
| <i>Æcidium compositarum</i> v. <i>Lapsanæ</i>           | . 13    | 92       |
| <i>Æcidium compositarum</i> v. <i>Prenanthes</i>        | .       | 91       |
| <i>Æcidium compositarum</i> v. <i>Tussilaginis</i>      | . 12    | 89       |
| <i>Æcidium crassum</i> , <i>P.</i>                      | . 7     | 94,95    |
| <i>Æcidium crassum</i> v. <i>cathartici</i> , <i>P.</i> | .       | 94       |
| <i>Æcidium crassum</i> v. <i>Frangulæ</i> , <i>P.</i>   | .       | 95       |
| <i>Æcidium crassum</i> v. <i>Periclymeni</i>            | . 102   | 96       |
| <i>Æcidium epilobii</i> , <i>DC.</i>                    | . 4     | 80       |
| <i>Æcidium euphorbiæ</i> , <i>P.</i>                    | . 6     | 302      |
| <i>Æcidium galii</i> , <i>P.</i>                        | . 9     |          |
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| <i>Lecythea valerianae</i> , <i>B.</i>             | 63      | 64       |
| <i>Lenzites betulina</i> , <i>Fr.</i>              |         | 302      |
| <i>Leotia lubrica</i> , <i>P.</i>                  | 231     |          |
| <i>Leptothyrium carpini</i> , <i>Lib.</i>          | 430     |          |
| <i>Leptothyrium fragariae</i> , <i>Lib.</i>        | 153     |          |
| <i>Leptothyrium juglandis</i> , <i>Lib.</i>        | 152     |          |
| <i>Leptothyrium ribis</i> , <i>Lib.</i>            | 151     |          |
| <i>Leptostroma filicinum</i> , <i>Fr.</i>          | 334     |          |
| <i>Leptostroma iridis</i> , <i>Ehr.</i>            | 426     |          |
| <i>Leptostroma juncinum</i> , <i>Fr.</i>           | 433     |          |
| <i>Leptostroma litigiosum</i> , <i>Desm.</i>       | 335     |          |
| <i>Leptostroma spireae</i> , <i>Fr.</i>            | 333     |          |
| <i>Libertella faginea</i> , <i>Desm.</i>           | 212     | 119      |
| <i>Lophiostoma bicuspidata</i> , <i>C.</i>         | 661     |          |
| <i>Lophium mytilinum</i> ( <i>non Duby</i> )       | 580     | 200      |
| <i>Lophium fusisporum</i> , <i>C.</i>              | 580     | 200      |
| <i>Lycoperdon pusillum</i> , <i>Fr.</i>            | 611     |          |
| <i>Lycoperdon pyriforme</i> , <i>Schf.</i>         | 215     |          |
| <i>Lycoperdon saccatum</i> , <i>Vahl.</i>          | 214     |          |
| <i>Macrosporium cheiranthi</i> , <i>Fr.</i>        | 197     |          |
| <i>Macrosporium cladosporioides</i> , <i>Desm.</i> | 620     | 161      |
| <i>Marasmius epiphyllus</i> , <i>Fr.</i>           | 407     |          |
| <i>Marasmius Hudsoni</i> , <i>Fr.</i>              |         | 404      |
| <i>Marasmius impudicus</i> , <i>Fr.</i>            | 405     |          |
| <i>Marasmius rotula</i> , <i>Fr.</i>               | 302     |          |
| <i>Marasmius Wynnei</i> , <i>B. &amp; Br.</i>      | 406     |          |
| <i>Massaria eburnea</i> , <i>Tul.</i>              | 371     |          |

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| <i>Massaria gigaspora</i> , <i>Not.</i>          | . 257   |          |
| <i>Massaria inquinans</i> , <i>Fr.</i>           | . 251   |          |
| <i>Melampsora betulina</i> , <i>Lev.</i>         | . 124   |          |
| <i>Melampsora euphorbiæ</i> , <i>Cast.</i>       | . 439   | 423      |
| <i>Melampsora populina</i> , <i>Lev.</i>         | . 83    | 153      |
| <i>Melampsora salicina</i> , <i>Lev.</i>         | . 85    | 155      |
| <i>Melampsora tremulæ</i> , <i>Lev.</i>          | . 84    | 154      |
| <i>Melanconis alni</i> , <i>Tul.</i>             | . 369   | 481      |
| <i>Melanconis modonia</i> , <i>Tul.</i>          | . 681   | 482      |
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| <i>Melanconium bicolor</i> , <i>N.</i>           | . 349   | 120      |
| <i>Melasmia alnea</i> , <i>Lev.</i>              | . 432   |          |
| <i>Merulius corium</i> , <i>Fr.</i>              | . 511   |          |
| <i>Merulius lacrymans</i> , <i>Fr.</i>           | . .     | 204      |
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| <i>Microcera coccophila</i> , <i>Desm.</i>       | . 350   |          |
| <i>Microsphæra berberidis</i> , <i>Lev.</i>      | . 95    | 283      |
| <i>Microsphæra comata</i> , <i>Lev.</i>          | . 94    |          |
| <i>Microsphæra grossulariæ</i> , <i>Lev.</i>     | . .     | 284      |
| <i>Microsphæra penicillata</i> , <i>Lev.</i>     | . 218   |          |
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| <i>Mucor hyalinus</i> , <i>C.</i>                | . 359   |          |
| <i>Mytilinidion gemmigenum</i> , <i>Fckl.</i>    | . 580   | 200      |
| <i>Namatelia virescens</i> , <i>Ca.</i>          | . 513   |          |
| <i>Nectria aquifolia</i> , <i>B.</i>             | . 260   |          |
| <i>Nectria caulina</i> , <i>n.s.</i>             | . .     | 479      |
| <i>Nectria cinnabarina</i> , <i>Fr.</i>          | . 259   | 474      |
| <i>Nectria coccinea</i> , <i>Fr.</i>             | . 494   |          |
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## EPICRISIS SYSTEMATIS FLORIDEARUM.\*

Auctore JACOBO GIORGIO AGARDH.

Algologists will hear with much satisfaction that Professor Agardh has just published Volume iii. of his work "SPECIES, GENERA, ET ORDINES ALGARUM."

The first volume of this work, it will be recollected, contains the Melanosperms; the second, published at four intervals (1849-1863), comprises the Florideæ; the third and last part of this volume treats of the Rhodomeleæ only.

\* Lipsiæ, apud T. O. Weigel. 1876.

Since the publication of the first and second parts of Vol. ii. great impulse has been given to the study of Algology by the voyages and publications of Dr. Harvey, and the numerous recent scientific expeditions, all of which have brought home immense numbers of specimens of Algæ in excellent condition and of all ages, and frequently with the fructification well developed. A great many of the species thus obtained were new to science; others afforded the means of correcting former errors of description and classification. Under these circumstances an entire revision of the second volume of Professor Agardh's work was highly necessary, and will be eagerly welcomed by Algologists.

The changes introduced are radical, extending not only to species and genera, but to orders also. The Orders (22 in number) are arranged under six series, and include 169 genera, of which 28 are new. The labour these changes have caused must have been enormous; numbers of examples of every species have been thoroughly examined, both as to their structure and fructification. On this point Professor Agardh states in his Preface that in the new volume, as in the preceding, no species has been admitted into the text which had not previously been examined by him. Species of doubtful character or affinity are placed at the end of each genus, under the title of "Species inquirenda." These, in some cases, constitute a sufficiently long list. Some species, however, easily recognised, have been admitted on the faith of well-executed figures.

Some idea of the immense quantity of materials from all parts of the world which were examined, and of the conscientious labour bestowed on the work, may be formed by the fact that, although the new volume extends to upwards of 700 pages (including the Index), new descriptions of well known species are not repeated, but reference is made in such cases, to the former descriptions in Parts 1 and 2 of Vol. ii. of "Species Algarum." Thus the present volume is strictly supplementary to the preceding parts of the work, and will prove of great value to Algologists, who have long felt the want of it.

Time and space do not admit of a complete analysis of the new volume. With regard to its effects upon the Algæ found on the British coast, it is apparent that an entire revision of the arrangement of the species, genera, and orders must be made. Before concluding this notice of the work, a few of the modifications effected may be mentioned. *Griffithsia secundiflora* has, from examination of the fruit, been placed in the new genus *Bornetia*; *Stenogramma* has been removed to Order III., GIGARTINEÆ, and is placed in Tribe 2, next to *Gymnogongrus*. A new genus has been created for *Schizymenia edulis*, namely, *Sarcophyllis*; and another new genus for *Wormskioldia sanguinea*, which is now *Hydrolapathum sanguinea*.

MARY P. MERRIFIELD.

## A NEW "TILLETIA."

By Prof. PASSERINI.

We have received from Professor Passerini of Parma, the following description of a *Tilletia*, believed to be new.

***Tilletia calospora.*** *Passer. Hb.*

Sporæ perfecte globosæ, fuscæ, crebræ reticulato-costatæ, costis parum prominulis.

Inter *T. sphaerococcam*, Rabh., et *T. controversam*, Kuhn., media. Huic sporarum forma similis, dum episporii characteribus ad illam accedit.

In spicis *Alopecuri agrostis*. Parma (Italy). June, 1875.

The globose spores are of the same size as those of *Tilletia controversa* and *Tilletia Lolii*, but deeper in colour, and with a thicker episore than in either. The reticulations are also different, forming smaller areolæ than in *T. controversa*. The spores of the four species above-named are nevertheless very similar. The habit, however, differs amongst them, and must be taken into account.

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# Grevillea,

A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY  
AND ITS LITERATURE.

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## NEW JERSEY FUNGI.

By M. C. COOKE and J. B. ELLIS.

(Continued from p. 35.)

A few additional North American species are enumerated, which have been received from other States.

2363. **Microsphæria extensa.** *C. & P.*—On oak leaves. Philadelphia (W. C. Stevenson).

Appears to be this species, but the fulcra and sporidia are immature.

2364. **Puccinia Hieracii.** *Mart.*—On Hawkweed. (W. C. Stevenson), Philadelphia.

If this can be maintained as a distinct species.

2365. **Cercospora grisea.** *C. & E.*—Cæspitibus minutis, punctiformibus, atrogriseis, late effusis. Hyphis brevis, simplicibus. Sporis linearibus multiseptatis.

On living leaves and flowers of *Polygala lutea*. Sept.

Spores rod-shaped, 0.12 m.m. long. Covering the entire leaves and stem with punctiform tufts, invisible to the naked eye, but imparting a greyish colour to the affected parts.

2366. **Sphæria (Diaporthe) tumulata.** *C. & E.*

Sparsa. Peritheciis distinctis, sub-immersis, brunneis; ostiolo elongato; ascis clavatis; sporidiis lanceolatis, quadrinucleatis, demum uniseptatis, hyalinis.

On twigs of *Corylus Americana*.

Perithecia almost membranaceous, distinct, buried in the wood, the long ostiolum piercing the bark. A distinct black line surrounds one or more of the perithecia, and descends deeply into the wood. Sporidia 0.12 m.m.  $\times$  0.005 m.m.

2367. **Badhamia penetralis.** *C. & E.*

Gregaria, stipitata. Peridiis subglobosis, albidis, demum atris; capillitio atro-fusco; stipite penetrante, fusco-atro; sporis globosis, atro fuscis, conglobatis.

On pine boards not much decayed.

This appears to be a distinct species. The penetrating stem to which threads of the capillitium are attached, is peculiar. The spores remain for a long time in globose masses, and do not separate freely. [Pl. 80, fig. 1. *b*, clusters of spores encysted; *c*, free spores.]

2368. *Sphæria aquila*. Fr. forma **minor**.—On twigs of *Corylus Americana*.

The perithecia are smaller than usual, but the fruit is the same.

2369. *Dichaena quercina*. Fr.—On living white oak branches.

An immature condition.

2370. *Acrothecium obovatum*. C. & E.

Atrum, effusum; floccis simplicibus, erectis, septatis, gracilibus, brunneis; sporis obovatis vel pyriformibus, apico-radiantibus, brunneis, opacis, biseptatis.

On decaying *Magnolia*. Sept.

Forming black velvety patches. Threads slender, simple. Spores obovate, with 2 septa, the upper cell equal to both the others; opaque, so that when mature the septa can scarcely be distinguished. (Pl. 80, fig. 13.)

2371. *Botrytis atroviridis*. C. & E.

Atro viridis; cæspitulis densis, elongatis; floccis septatis fuscis, superne ramosis; ramulis brevis oppositis; sporis minutis ovatis.

On oak stump.

This is so decidedly the conidia of some species of *Hypoxylon*, that it has had a name applied to it with hesitation, and temporarily, until it can be referred to the *Hypoxylon* to which it belongs. (Pl. 81, fig. 10.)

2372. *Sphæria (Caulicolæ) comatella*. C. & E. (See. No. 2392.)

On dead stems of *Aster*.

Differs only from the typical form in the almost obsolete hairy mouth. The sporidia are the same.

2373. *Stictis quercifolia*. C. & E.

Hypophylla, orbicularis, parvula; margine, lacerato-dentato, disco griseo-albido; ascis cylindræis; sporidiis filiformibus; paraphysibus linearibus, supra leniter incrassatis.

On oak leaves.

Not more than  $\frac{1}{4}$  m.m. broad; sporidia .06-.07 m.m., nearly the length of the ascus. (Pl. 81, fig. 7.)

2374. *Sphæropsis alni*. C. & E.

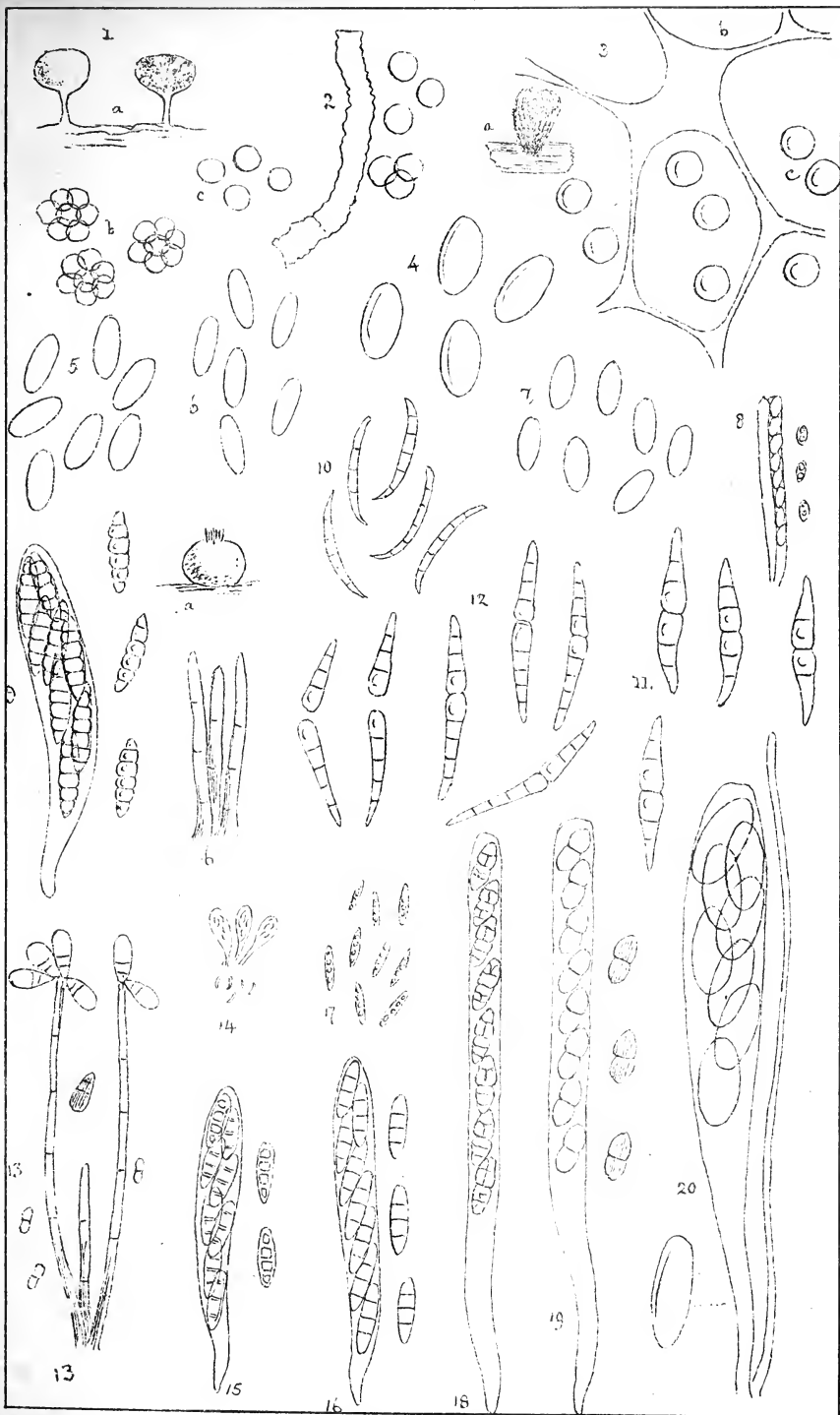
Peritheciis erumpentibus, 3-4 congestis, brunneis, ovatis, submembranaceis; sporis magnis, ellipticis, brunneis.

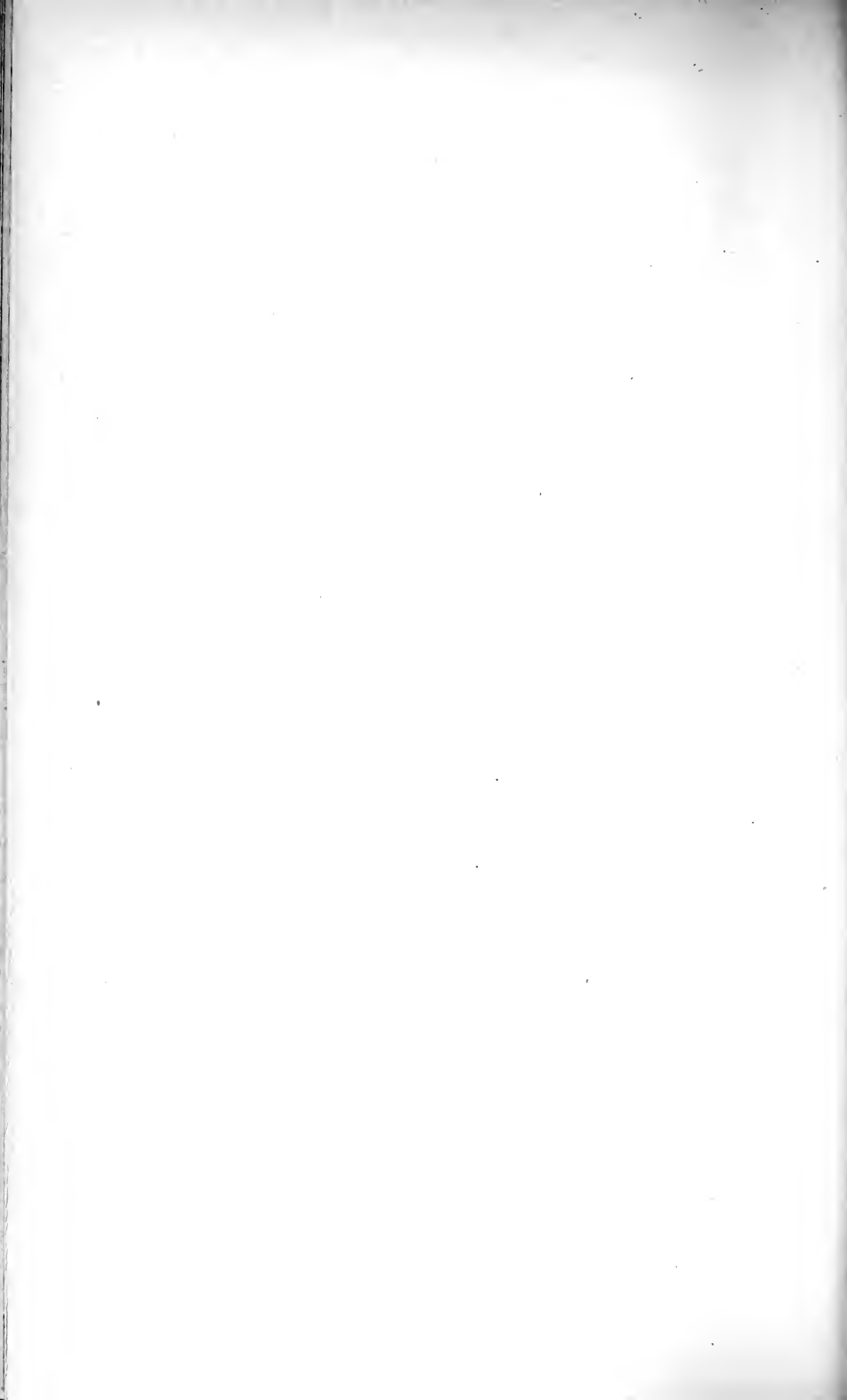
On living alder bark (*Alnus serrulata*.) Sept., 1876.

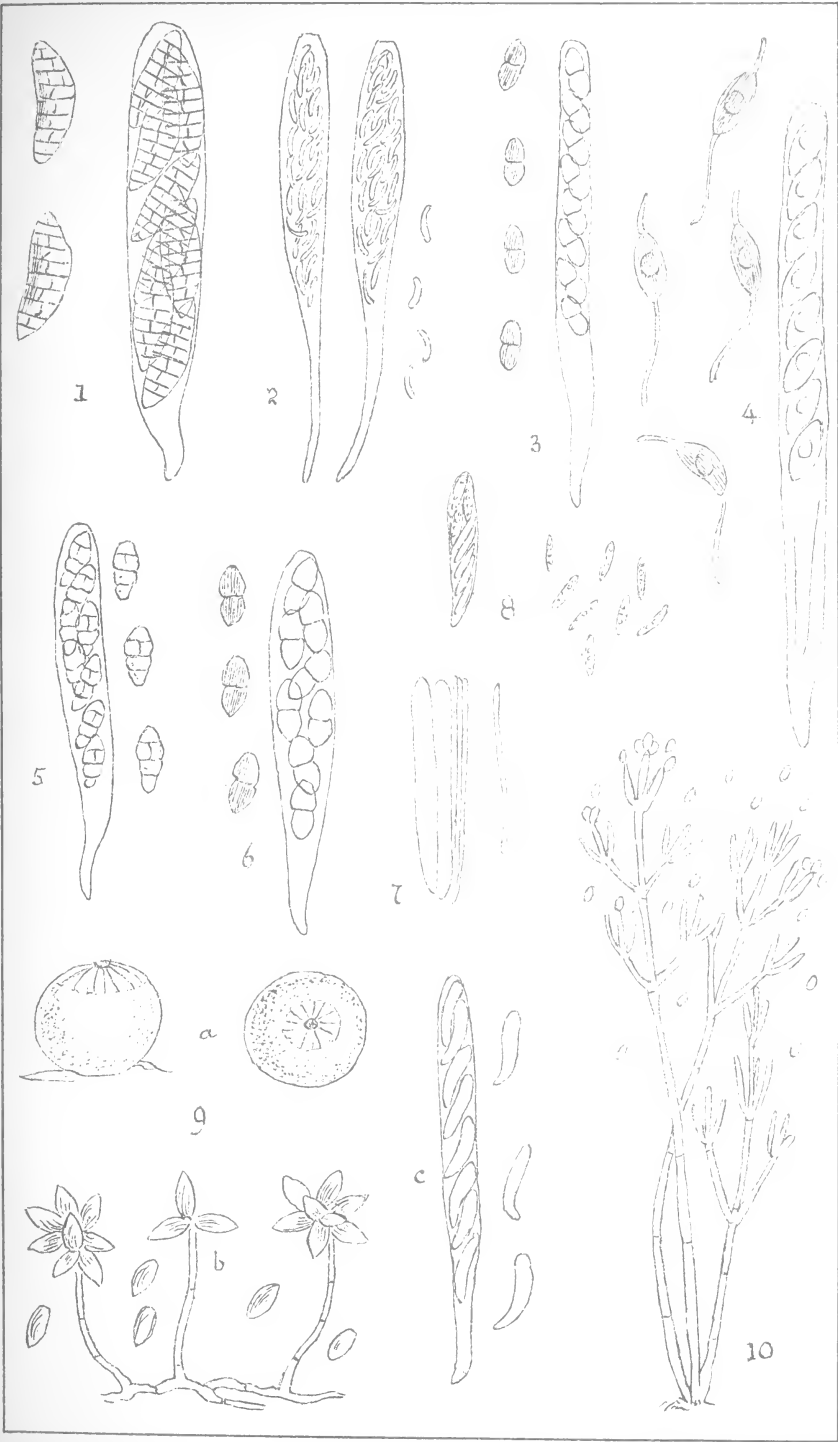
Spores .025-.03  $\times$  .01-.016 m.m. (Pl. 80, fig. 4.)

2375. *Fusisporium episphericum*. C. & E.

Tremelloideum, albidum; sporis fusiformibus, arcuatis, utrinque acutis, plurinucleatis, dein 3-5 septatis, hyalinis.









Growing on a species of *Diatrype* (without fruit) on dead branches of *Corylus avellana*.

Resembling in habit *Tremella albid*a; spores  $\cdot 04 \times \cdot 004$  m.m., strongly curved, acute at the extremities; threads very slender, often long, interwoven and branched. The *Diatrype* being without fruit, could not be determined. (Pl. 80, fig. 10.)

2376. **Coniothyrium subtile**. *Corda*. Icon. iv. fig. 107.

On bleached wood of white cedar.

2377. **Sphæria (Immersæ) livida**. *Fr.*—On decorticated wood. (Pl. 80, fig. 18.)

2378. **Sphæria (Obtectæ) microtheca**. *C. & E.*

Peritheciis subgregariis; tectis, globosis, atris; collo elongato, flexuoso; ascis minutissimis, pyriformibus; sporidiis allantoides.

On *Andromeda* twigs.

Seated on the wood, and piercing the bark with the elongated ostiola. When the bark falls away resembling a species of the section *Denudatæ*. Asci very minute, narrowly pear-shaped,  $\cdot 025 \times \cdot 01$  m.m. The sausage-shaped sporidia are also proportionally minute and spermatoid. (Pl. 80, fig. 14.)

2379. **Diderma**. sp.—On old pine boards.

This appears to be a red-brown species, allied to *D. vernicosum*, but smaller and sessile. It has been dried before maturity, and therefore the spores are not formed, and it is in too imperfect a condition for description.

2380. **Stemonitis confluens**. *C. & E.*

Fasciculata, confluenta in hypothallo persistente, atro-fusca; peridiis fugacissimis; stipite furcatis, erectis, ad basim conjunctis; sporis brunneis, magnis, globosis.

On oak bark.

The stems are branched in a furcate manner, and confluent at the base, forming a compact tuft. The capillitium is membranaceous at the angles; spores very large compared with allied species, being  $\cdot 012$  m.m. diam.; the specimens were too fully matured for a complete and satisfactory description. (Pl. 80, fig. 3. b, portion of capillitium with spores.)

2381. **Sphæria (Caulicolæ) dissiliens**. *C. & E.*

Peritheciis sparsis, atris, demum erumpentibus, subglobosis, ostiolis punctiformibus; ascis clavatis; sporidiis longe fusiformibus, 8-septatis, simul constrictis, et dissilientibus, hyalinis.

On stems of *Desmodium strictum*.

Sporidia  $\cdot 07 \times \cdot 009$  m.m., constricted and divided into two unequal portions, one of which is 3-septate the other 4-septate, readily dividing at the constriction. (Pl. 80, fig. 12.)

2382. **Sphæria (Caulicolæ) comatella**. *C. & E.*—On stems of *Desmodium strictum*.

2383. **Hypoderma virgultorum**. *DBy.*—On stems of *Desmodium strictum*.

2385. **Eutypa maura.** Fr.—On hickory root.

Sporidia larger than in *Eutypa lata* and *E. Acharii*.

2386. **Ascobolus Leveillei.** Boudier. var. **Americanus.** C. & E.—On cow dung.

Apparently differing little from the typical form, except in the slightly larger sporidia, which are  $\cdot 03\text{--}\cdot 04 \times \cdot 015$  m.m. (Pl. 80, fig. 20.)

2386\* **Sphæria (Sporormia) minima.** Awd.—On cow dung with the above.

Curious quadripartite brown sporidia, soon breaking up into four joints.

2387. **Dichaena strumosa.** Fr.—On living branches of black oak.

It is doubtful whether this is any other than a form of *Dichæna quercina*, Fr. The present specimens are in the stylosporous condition.

2389. **Sporotrichum sulphureum.** Grev.—On dead leaves.

2390. **Sphæria (Caulicolæ) acuminata.** Sow.—On dead stems of *Bidens*.

Differing but little from the more common form on thistles.

2391. **Sphæria (Caulicolæ) dolium.** P.—On old potato stems.

2392. **Sphæria (Caulicolæ) comatella.** C. & E.

Gregaria, vel sparsa; peritheciis ovatis, nigro-brunneis, tectis; ostiolis erumpentibus, pilis brevibus rigidis erectis ornatis; ascis clavatis, subsessilibus; sporidiis abrupte fusiformibus, 5-septatis, constrictis, hyalinis; spermatis minutis. (No. 2402.)

On dead stems of asparagus.

This species is easily to be recognised by the circle of short, rigid, erect brown hairs, which girt the ostiolum; sporidia abruptly fusiform, 5-septate, deeply constricted at each septum, hyaline,  $\cdot 035\text{--}\cdot 04 \times \cdot 009$  m.m.

It appears to be related to *Sphæria comata*, Todè. (Pl. 80, fig. 9.)

2393. **Sphæria (Caulicolæ) comatella.** C. & E. (See No. 2392.)

On asparagus stems.

2394. **Sphæria (Caulicolæ) Orthogramma.** Berk. & Curt.—On corn stalks. (*Zea Mays*.)

This is just the plant described by B. & C., except that the sporidia appear to be more mature; they are fusiform, pale-brown, with the ultimate joints at length divided so as to become 5-septate; sporidia  $\cdot 05\text{--}\cdot 06 \times \cdot 01$  m.m. (Pl. 80, fig. 11.)

2395. **Sphæria (Caulicolæ) comatella.** C. & E. (See No. 2392.)—On old mullein stalks.

2396. **Peziza (Hymenoscypha) nigrescens.** C.—On mullein stems.

2397. **Sphæropsis Caryæ.** C. & E.

Peritheciis linearis, subtectis, demum, erumpentibus; sporis ellipticis, brunneis.



On hickory bark.

Spores  $\cdot 025 \times \cdot 01\text{--}\cdot 012$  m.m., brown, variable in size; perithecia bursting through the bark in linear series. (Pl. 80, fig. 5.)

2398. **Valsa Abietis.** *Fr.*—On bark of white cedar.

2399. **Sphæria (Diaporthe) orthoceras.** *Fr.*—On stems of worm-wood.

The small quadrinucleate sporidia are about  $\cdot 015$  m.m. long. (Pl. 80, fig. 17.)

2401. **Sphæria (Villosæ) hispida.** *Fr.*—On pine wood.

2402. **Sphæria comatella.** *C. & E.*—SPERMOGONIA.

*Gregaria, minuta, brunnea; spermatii minutis.*

On stems of mullein.

Associated with the *Sphæria*, of which it is doubtless the spermogonia.

2403. **Diatrype cincta.** *B. & Br.*—On oak bark.

Sporidia  $\cdot 018 \times \cdot 009$  m.m., uniseptate, constricted, brown. (Pl. 80, fig. 19.)

2404. **Nectria microspora.** *C. & E.*

*Cæspitosa, parvula, aurantio-rubra. Peritheciis 3-10, globosis, lævis, minutis, demum collapsis; ascis cylindraceis; sporidiis ovalibus, binucleatis.*

On bark of *Magnolia*.

This minute species is scarcely visible to the naked eye. The clusters of perithecia from  $\frac{1}{2}$  to 1 m.m. long and the perithecia not exceeding  $\frac{1}{6}$  m.m. in diameter, the sporidia  $\cdot 0075 \times \cdot 004$  m.m. (Pl. 80, fig. 8).

2405. **Sphæria (Byssisedæ) solaris.** *C. & E.*

*Peritheciis gregariis, globosis, pertusis, atris, e subiculo-pulverulento, fusco, conidiophoro emergentibus; ascis cylindraceis; sporidiis subclavatis, curvulis, hyalinis; conidiis amygdaloideis, atro-fuscis.*

On pine wood

Perithecia globose; ostiolum radiato-sulcate; conidia in clusters on the apices of short, septate, simple threads, which constitute the subiculum; sporidia  $\cdot 03 \times \cdot 006$  m.m., curved; conidia almond-shaped, opaque, brown,  $\cdot 012\text{--}\cdot 014 \times \cdot 008$  m.m. (Pl. 81, fig. 9. *a*, perithecia; *b*, conidia; *c*, ascus and sporidia.)

2406. **Diderma testaceum.** *Fr.*—On old leaves.

The globose spores are about  $\cdot 008$  m.m. diam.

2407. **Sphæria (Pertusæ) diaphana.** *C. & E.*

*Gregaria, minuta; peritheciis globosis, compressis, membranaceis, brunneis, poropertusis; ascis subclavatis; sporidiis arcute, ellipticis, hyalinis; endochromate triplo-divisis.*

On decorticated branches.

Sporidia  $\cdot 02 \times \cdot 0075$  m.m., with the endochrome thrice divided. (Pl. 80, fig. 15.)

2408. **Sphæria solutæ.** *C. & E.*

Peritheciis sparsis, semi-immersis, solubilis, superne attenuatis; ascis clavatis; sporidiis biserialibus, cylindricis, triseptatis, hyalinis.

On pine boards.

Sporidia  $\cdot 025 \times \cdot 008$  m.m. The perithecia are easily removed, or fall out of the matrix. (Pl. 80, fig. 16.)

2409. **Ophiotheca umbrina.** *B. & C.*—On *Ænothera*.

The globose spores are about  $\cdot 01$  m.m. diam. (Pl. 80, fig. 2.)

2410. **Sphæria (Caulicolæ) doliolum.** *P.*—On *Ænothera biennis*.2411. **Solenia candida.** *Fr.*—On bark of white cedar.2412. **Diatrype quercina.** *Fr.* var. **lignicola.** *C. & E.*—On decorticated oak branches.

It is deemed more prudent to consider this for the present as a variety of the common *Diatrype quercina*, *Fr.*, although very different in appearance on account of the matrix. The asci are clavate, elongated, stipitate, with numerous sausage-shaped spores, brownish in the mass, as in the typical form.

2413. Imperfect condition of some Fungus, probably *Stictis quercifolia*.

On oak leaves.

2414. **Peziza (Tapesia) subiculata.** *Schw.*—On dead *Vaccinium*.

This is probably the species intended by Schweinitz. It much resembles *Peziza fusca*, with a tawny disc.

2415. **Hysterium subrugosum.** *C. & E.*

Sparsum, atrum, opacum; peritheciis ellipticis, vel linearibus, obtusis, transversim subrugosum; labiis rigentibus; ascis clavatis; sporidiis ellipticis, utrinque sub-attenuatis, fuscis, fenestrato-septatis.

On hard dry oak.

Sporidia multiseptate, with transverse septa, pale brown,  $\cdot 045 \times \cdot 015$  m.m. We have seen no species to which these specimens can be referred. (Pl. 81, fig. 1.)

2416. **Hysterium hyalinum.** *C. & Pk.*—On old oak stump. (Pl. 81, fig. 5.)2417. **Hysterium Gerardi.** *C. & Pk.*—On decorticated maple.2418. **Hysterium Gerardi.** *C. & Pk.*—On decorticated wood.2419. **Peziza (Mollisia) coccinella.** *Somm.*—On dry oak limbs.2420. **Vermicularia compacta.** *C. & E.*

Peritheciis gregariis, hispidis, atris, distinctis, compactis; sporis, fusiformibus, curvulis, utrinque acutis, nucleatis, denum septatis.

On *Vitis vinifera* twigs.

The curved spores are about  $\cdot 02$  m.m. long, at length faintly septate. The perithecia are disposed at regular distances, entirely surrounding the twig for some inches, giving a peculiar rough appearance.

2421. **Valsa tetraploa.** B. & C.—On *Juglans nigra*.

2422. **Sphæropsis Ribicola.** C. & E.

Peritheciis gregariis, epidermide tectis, elevatis; sporis ellipticis, brunneis.

On currant twigs.

Spores  $\cdot 022 \times \cdot 009$  m.m. brown. (Pl. 80, fig. 7.)

**Sphæropsis Rhamni.** Cooke.

Peritheciis gregariis; primum epidermide tectis, demum transverse fissuratis; sporis arcte ellipticis, brunneis.

On bark of *Rhamnus* (Dr. Curtis).

Sporis  $\cdot 025 \times \cdot 0075$  m.m. Similar to the last, but with narrower spores. (Pl. 80, fig. 6.)

2423. **Discosia artocreas.** Fr.—On oak leaves.

**Capillaria Sphæria-typhinae.** Corda Icon. ii. t. 10, f. 35.

*Sporotrichum Sphæria-typhinae*, Rabh. Deut. Fl. 733.

On *Epichloe typhina*. New York (Peck, 401).

**Sphæria (Pertusæ) phileura.** C. & Peck.

Sparsa. Peritheciis orbicularibus, depressis, semi-immersis, atris; ostiolo simplici, pertuso; ascis clavatis; sporidiis biserialis, ellipticis, uniseptatis, brunneis, parum constrictis.

On bark of *Tilia Americana*. New York (Peck, No. 290).

Sporidia  $\cdot 022 \times \cdot 01$  m.m.; perithecia punctiform, small. (Pl. 81, fig. 6).

**Valsa Celtidis.** Cooke.

Perithecia irregulariter circinantia, sub-immersa; ostiola atra, in disco brunneo emergens; sporidiis uniseriatis, ellipticis, uniseptatis, brunneis.

On branches of *Celtis* (Rav. 1833), S. Carolina.

The perithecia, 6-8 together, are circumscribed by a black line; the ostiola are emergent in a brown pulverulent disc, and hence it can hardly be the same as *Sphæria Celtidis*, B. & C. (Grevillea, No. 930); sporidia  $\cdot 02 \times \cdot 01$ , uniseptate, brown, constricted at the centre. (Pl. 81, fig. 3.)

**Melanconis amygdalina.** Cooke.

Laxe circumscripta, stromate pallida; peritheciis circinantibus, globosis; ostiolis convergentibus in disco fusco, prominulis; ascis cylindræis; sporidiis amygdalæformis, utrinque appendiculatis.

On *Liquidambar* (Ravenel), S. Carolina.

Apparently a *Melanconis*.

Sporidia almond-shaped, brown, with a large globose nucleus,  $\cdot 023\text{--}\cdot 025 \times \cdot 012$  m.m., with a slender hyaline appendage at each end. (Pl. 81, fig. 4.)

2356 bis. **Psilonia apalæspora.** B. & Br.

The previous specimen appears to have been mixed with *Vermicularia*.

## NEW BRITISH FUNGI.

By M. C. COOKE, M.A.

*(Continued from page 14.)***Agaricus (Armillaria) bulbiger.** *A. & S.*

Figured from drawings by W. Phillips, Esq., of Shrewsbury.  
(Pl. 77, fig. 1.)

**Agaricus (Clitopilus) cretatus.** *B. & Br.*

Figured from drawings by W. Phillips. (Pl. 77, fig. 3.)

**Agaricus (Nolanea) rufocarneus.** *B. & Br.*

Figured from drawings by W. Phillips. (Pl. 77, fig. 2.)

**Agaricus (Tubaria) autochthonus.** *B. & Br.*

Figured from specimens collected at Shobden Court, when visited  
by the Woolhope Club. (Pl. 77, fig. 4.)

**Agaricus (Pholiota) Cookei.** *Fr. in Litt.*

Pileo carnoso, e conico convexo, udo viscido, squamis obscurioribus adpressis consperso, sordide helvolo; stipite solido aequali, fibrilloso, inferne rufo-brunneo, annulo tenerrimo, lamellis adnatis, leviter ventricosis demum brunneis.

On the ground. Dinmore (Oct., 1876. M.C.C.) in Derbyshire  
(Oct. 1873, J. Renny.)

"Videtur lignicolæ ut omnes affines. Proximus *Ag. subluteo*  
*Flor. Dan.*"

Stem 2 in. long 2 lines thick. Pileus 2 in. broad.

Colored figures will be given in a succeeding part of "*Grevillea*."

**Cortinarius (Phlegmacium) saginus.** *Fr. Epicr. p. 340.*

Pileus fleshy, plano-convex, unequal, smooth, viscid; stem solid, sub-bulbous, fibrillose, becoming yellowish, naked above, veil fugacious, gills decurrent, broad, eroded, pallid then cinnamon.

On the ground in woods, near Hereford, Dr. Bull.

Gregarious; stem 3 in. long, 1 in. thick; pileus 4-5 in. broad, yellow. Flesh white.

Figure of this elegant species will shortly be given.

**Cantharellus Houghtoni.** *Ph.*

Figured from drawings by W. Phillips. (Pl. 76, fig. 1.)

**Lactarius pubescens.** *Fr.*

Figured from drawings by W. Phillips. (Pl. 76, fig. 2.)

**Septoria avellanæ.** *B. & Br. Ann. N.H., No. 1606.*

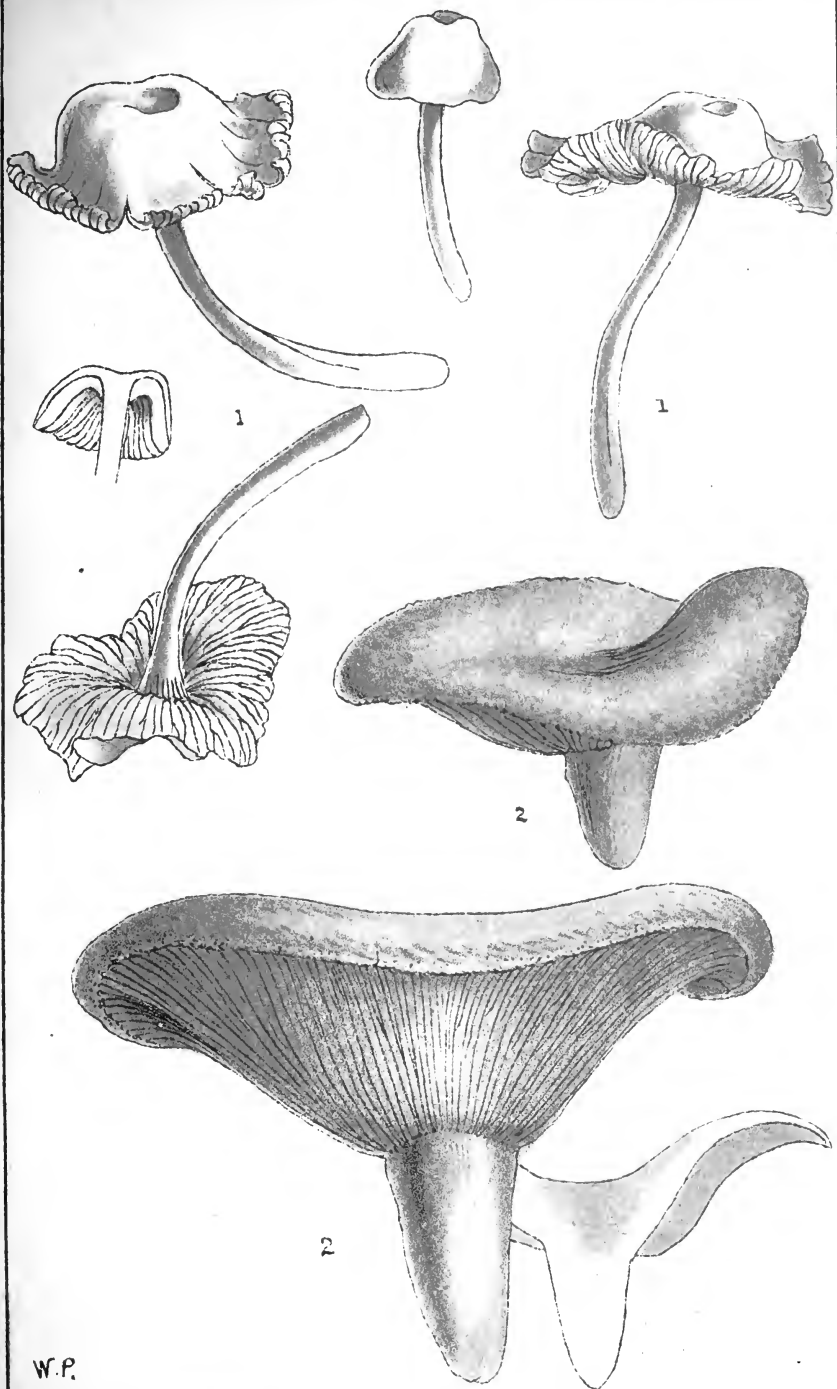
Hypophyllous; perithecia circinate; spores fusiform, curved.—  
*Rabh. F. E.*, 1958.

On leaves of *Corylus avellana*. Bathford.

Spores .0004 in. long.

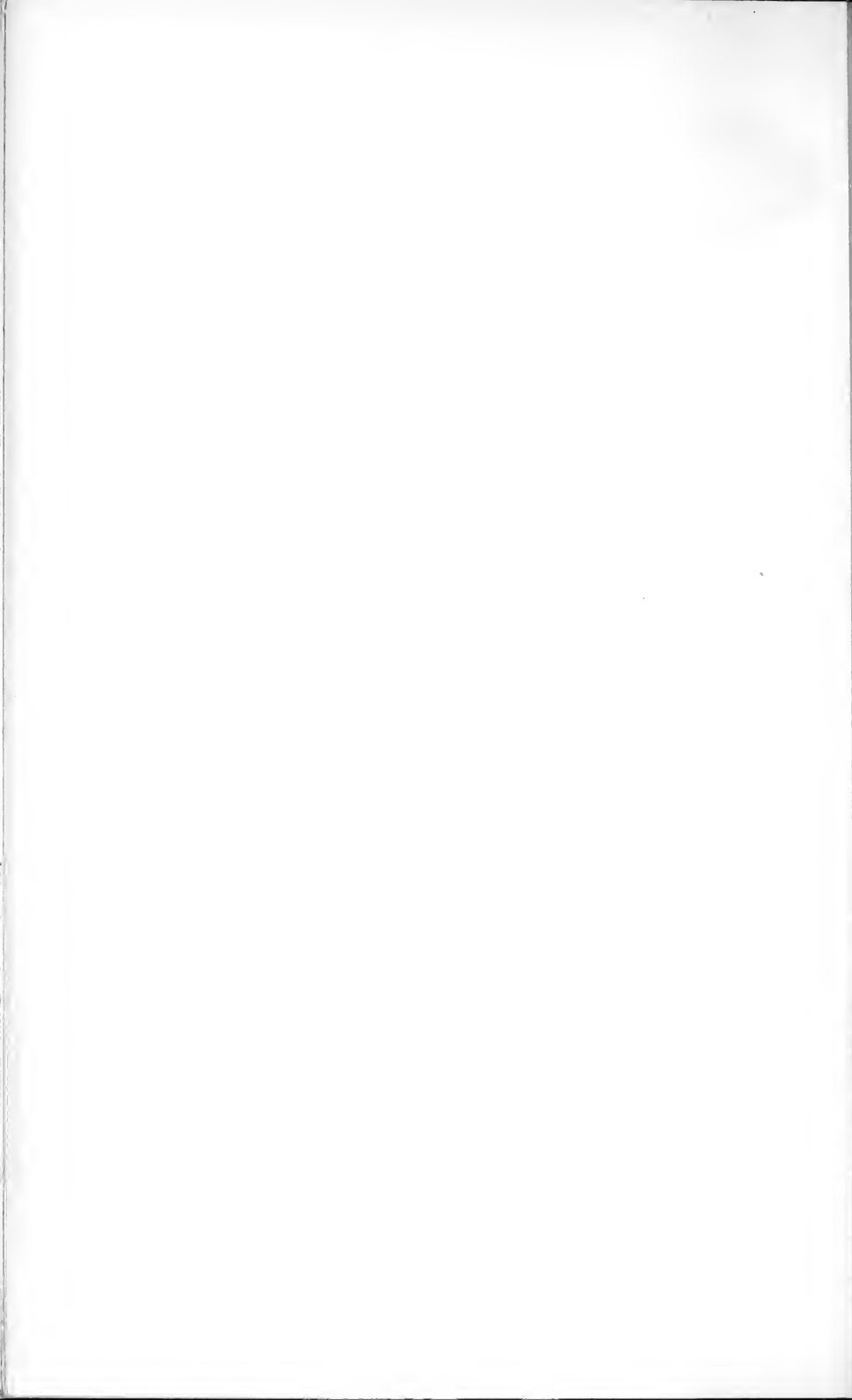
**Cystotricha aurodisca.** *C.*

Perithecia oval or elliptic, black, splitting longitudinally, margin serrate, disc orange, sporophores slender, branched above; spores cylindrical, simple.



W.P.

1 *Cantharellus Houghtoni*. Ph. 2 *Lacrarius pubescens*. Fr.

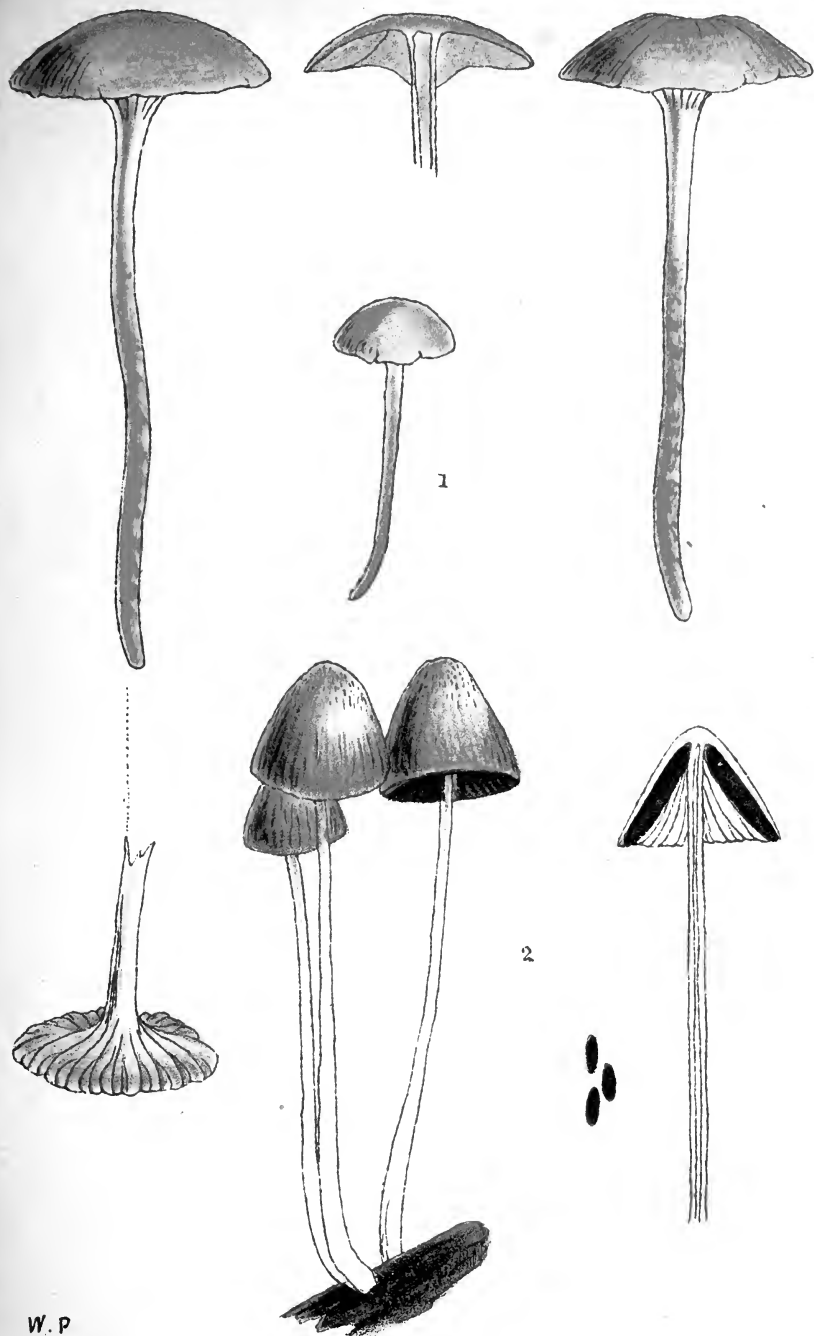




1. *Agaricus bulbiger*. A & S. 2. *Agaricus rufo-carneus*. B.  
 3. *Agaricus cretatus*. F. 4. *Agaricus autochthonus* B.



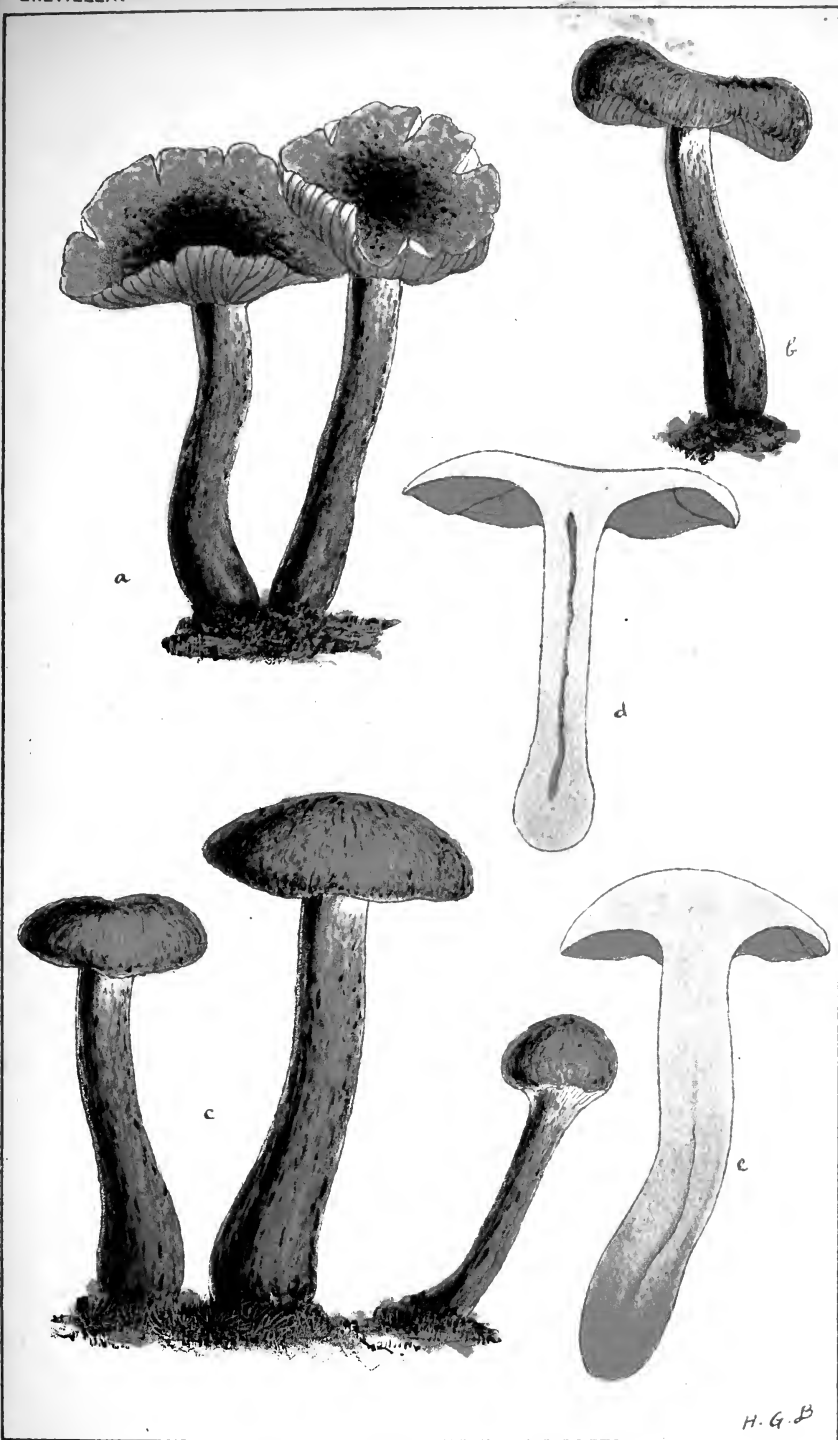




W. P

1. *Hygrophorus Houghtoni*. B & Br. 2. *Agaricus bifrons*. B.





CORTINARIUS BOLARIS. FR.



On chips. Darenth.

When moist it looks like a large *Phacidium*, with a black dentate margin, and convex orange disc. In that condition it is rather gelatinous; probably an incomplete condition of some *Discomyctous* fungus.

**Sporidesmium triglochinis.** *B. & Br. Ann. N.H., No. 1607, t. 10, f. 4.*

Sori punctiform, springing from a cellular base; young spores obovate, stem short, incrassated upwards, then subglobose, obliquely divided, at length oblong, fenestrate.

On *Triglochin palustre*. March. Rannock.

Sori bright brown, .006-.008 in.; spores .0003-.0007 in., approaching *S. pallidum*, B. & C., but that is on fir, and the spores are not composed of globose cells as in that species.

**Æcidium depauperans.** *Vize. Gard. Chron.*

Spots none, peridia scattered, at first round, becoming elongated, parallel with the length of the stem; spores yellow.

On *Vivla cornuta*. Forden (Rev. J. E. Vize).

**Puccinia moliniæ.** *Tul. Ann. Sc. Nat., Sept., 1854, p. 141.*

*Pl. ix., fig. 9-11.*

Sori punctiform, oblong, linear or very long, solitary, scattered, or partly confluent, dark-brown; spores broadly elliptical, obtuse, even, on long pedicels, cells nearly equal.—*B. & Br. Ann. N.H., No. 1608.*

On *Molinia cærulea*. Perth.

**Puccinia calthæ.** *Link. Cooke, Handbook, No. 1499. B. & Br. Ann. N.H., Feb. 1876., p. 141.*

On leaves of *Ranunculus ficaria*. New Pitsligo.

**Urocystis gladioli.** *Sm. in Gard. Chron., 1876, p. 420.*

Sori obliterated, or effused; spores large, compound, consisting of 3-6 inner brown cells, and a larger, indefinite number of nearly transparent out cells; both series fertile.

Within corms of *Gladiolus*.

For figures and full description, see *Gardeners' Chronicle* above cited.

**Ustilago Kuhniana.** *Wolff, in Bot. Zeit., 1874, p. 815.*

Spores irregularly rounded, reddish-violet; epispore finely reticulated; sporidia small, copious, verticillate.—*Rabh. F. E., No. 1989. Hedwigia, 1875, p. 28.*

On *Rumex acetosa* (Dr. Masters).

Spores .014-.016 m.m. diam.

**Ustilago Candollei.** *Tul. Ann. Des. Sci. Nat. (1847) p. 93.*

Spores elliptic or ovate, even, dark-violet.—*Cooke, Fungi Britt. ii., No. 72.*

On flowers of *Polygonum*.

**Stilbum melleum.** *B. & Br. Ann. N.H., No. 1609, t. 10, f. 5.*

Minute, pale yellow; stem short, dilated upwards, hispid; spores globose, small; rough globose corpuscles embedded in the substance.

On bark. Jan.

In form resembling *Ciliciopodium violaceum*. Head composed of clavate processes,  $\cdot 009$ – $\cdot 01$  in. across, covered with sugary particles; globose rough bodies,  $\cdot 0005$  in. diam., appear to be embedded in the substance.

**Fusarium translucens.** *B. & Br. Ann. N.H., No. 1610.*

Pellucid, substipitate, margin under a lens delicately ciliate; white, becoming yellowish, umbilicate above; spores slender, cylindrical.

On deal. Glamis.

Forming little transparent specks, about  $\frac{1}{6}$  line diam.; spores  $\cdot 0003$  in. long. Differs from *F. minutulum*, Ca., in the form of the spores.

**Fusarium cucumerinum.** *B. & Br. Ann. N.H., No. 1611.*

Pale orange, sub-globose, then effused; spores shortly fusiform.

On diseased cucumbers.

Spores  $\cdot 0005$  in. long.

**Fusarium rhabdophorium.** *B. & Br. Ann. N.H., No. 1612.*

Erumpent, tawny, elevated from a white orbicular base; spores straight, wand-shaped.

On dead sticks. Forres.

Spores  $\cdot 0006$  in. long.

**Cylindrosporium senecionis.** *B. & Br. Ann. N.H., No. 1613.*

Forming white, conspicuous, irregular patches; flocci flexuose, slender; spores cylindrical.

On leaves of *Senecio vulgaris*.

Spores variable in length,  $\cdot 0003$ – $\cdot 0006$  in.

**Penicillium coffeicolor.** *B. & Br. Ann. N.H., No. 1614.*

Broadly effused, umber, flocci short, rather thick; spores large, globose.

On Pasteur's solution.

Spores varying much in form; the most perfect are smooth, with a large nucleus, and about  $\cdot 0005$  in. diam.

**Rhinotrichum decolorans.** *Cooke.*

Snow-white, soon becoming tawny; threads erect, furcate two or three times at the tips, terminal joints, clavate; spores globose, rough, with a very short apiculus.

On beech mast. Forden.

The branches terminate at the same level, and are approximate; threads pale-brownish; spores hyaline, not more than  $\cdot 004$  m.m. diam.

**Helminthosporium rhopaloides.** *Fres. Beitr. t. vi., f. 15-21.*

Black, effused; flocci fasciculate, erect, with a few short branches at the apex; spores cylindrical, multiseptate, obtuse, basal cell uncoloured.—*Cooke, Fungi Britt. ii., No. 448.*

On sacking, with *Torula*. Forden (Rev. J. E. Vize).

**Fusisporium obtusum.** *Cooke.*

Tremelloid, white; spores cylindrical, somewhat narrowed to each end, obtuse, triseptate, on very short threads.

Parasitic on old *Diatrype*. Forres, Rev. J. Keith.

Spores  $\cdot 04 \times \cdot 005$  m.m. A similar species has occurred on *Diatrype* in North America, which is also white, often larger, and with different fruit.

**Exobasidium Vaccinii.** Woron. *Nat. Ges. Freib.* iv. *B. & Br. Ann. N.H.*, No. 1615. *Thumen Fung. Aust.*, No. 322.

On leaves of *Vaccinium*.

On *Rhododendron* it forms a thick gall-like swelling.

**Schinzia alni.** Wor. *Ann. Sci. Nat.*, ser. 5, vol. x., t. 6, f. 1-7.  
*B. & Br. Ann. N.H.*, No. 1616.

Forming tubercles on the roots of alder. Powerscourt.

**Leotia circinans.** *P. Fr. Sys.* ii. 27. *Mycographia*, fig. 172. *Grevillea*, iii. p. 66. *B. & Br. Ann. N.H.*, No. 1617.

On the ground. Glamis.

**Vibrissea microscopica.** *B. & Br. Ann. N.H.*, No. 1618.

Very minute; stem short, black; head grey; sporidia ejected, filiform.

On damp fir wood. Rannoch.

Scarcely visible without a lens.

**Peziza (Aleuria) ammophila.** *DR. & Lev. Flor. Alg.* t. xxviii., fig. 2.

Stipitate, turbinate, rooting, pallid; mouth dentato-lacerate, contracted; disc ochraceous; asci cylindrical; sporidia elliptical, hyaline; paraphyses slightly thickened above.—*Mycographia*, fig. 100. *Peziza arenaria*, *B. & Br. Ann. N.H.*, No. 1619.

About the roots of *Psamma*. St. Andrews. Rev. Mark Anderson.

Cups from  $\frac{1}{2}$  to 2 in. broad; stem long and thick, rooting; substance exceedingly fragile; sporidia  $\cdot 02 \times \cdot 012$  m.m.

This species was included under *Sarcoscypha*, in *Mycographia*. Not having seen specimens at that time, and no description being published in the *Flore d'Algerie*, it was uncertain to which division it belonged. Having since seen specimens in Paris, as well as the above, we refer it without doubt to *Aleuria*.

**Peziza (Macropodes) corium.** *Weberbauer Pilze* t. iii., fig. 7.

Stipitate, waxy, somewhat coriaceous when dry; cups saucer-shaped, sometimes laterally compressed, blackish, velvety externally; stem equal, sulcate, smooth, paler at the base; asci cylindrical; sporidia elliptical; paraphyses clavate, brown.—*Cooke, Mycographia*, fig. 187.

On the ground. King's Lynn. C. B. Plowright.

Sporidia  $\cdot 018\text{--}\cdot 02 \times \cdot 01$  m.m.

**Peziza (Macropodes) Percevali.** *Berk. & C. Mycographia*, fig. 192.

Solitary. Cups soon expanded, subpruinose; margin narrowly inflexed; stem rather thick, attenuated downwards, with a few rooting fibrils; asci clavato-cylindrical; sporidia elliptic; paraphyses brownish.—*P. ciborium*, var. *B. and Br. Ann. N.H.*, No. 1479.

On the ground.

Cups  $\frac{1}{2}$  in. broad; stem  $1-1\frac{1}{2}$  in. long,  $\frac{1}{4}$  in. thick; sporidia  $\cdot 025 \times \cdot 012$  m.m.

**Peziza (Cochleatae) apophysata.** *C. & Ph.*

Brown, unequal, irregularly lobed and contorted, or with one side elongated; disc dark brown; asci cylindrical; sporidia elliptic, binucleate; paraphyses slender, with short, furcate, and often clavate branches above.

In a damp ditch. Shrewsbury. W. Phillips, Esq.

The paraphyses differ from any that we have yet seen in their peculiar branching, and in the almost universal presence of these lateral expansions. Cups  $\frac{1}{2}$ -1 inch broad; sporidia  $\cdot 02\text{--}\cdot 022 \times \cdot 012$  m.m.

**Peziza (Cochleatae) luculeuta.** *Cooke in Mycographia, fig. 208.*

Sessile, fleshy, bright orange; cups concave, externally fibrillose, paler; asci cylindrical; sporidia elliptical, obtuse, without nuclei, smooth; paraphyses clavate above, orange.

On the ground (H. C. Sorby, Esq., F.R.S.).

Cups scarcely an inch broad; sporidia  $\cdot 025 \times \cdot 012$  m.m.

**Peziza (Cochleatae) auricula.** *Cooke in Mycographia, fig. 213.*

Subcaespitose, fleshy, one side elongated, ear-shaped, fleshy, red, externally farinose; asci cylindrical, stipitate; sporidia ellipsoid, even; paraphyses clavate above.—*Peziza cochleata*, Fung. Britt. i. 473.

On the ground.

Cups 1-2 in broad and high; sporidia  $\cdot 022\text{--}\cdot 028 \times \cdot 012\text{--}\cdot 014$  m.m.

**Peziza (Cupulares) purpurascens.** *Pers.*

Sessile, livid, becoming purplish; cups campanulate, soon expanded; asci cylindrical; sporidia elongated, obtuse, binucleate.—*Pers. Myc. Eur. p. 242, t. 12, f. 10.*

On the ground.

This species has been found by Mr. W. Phillips near Shrewsbury, and also by Mr. C. B. Plowright at King's Lynn; cups  $\frac{3}{4}$  in. broad; sporidia  $\cdot 02 \times \cdot 022 \cdot 007$  m.m.

**Peziza (Humaria) domestica.** *Sow. Fung. t. 351 Cooke, Handbk. No. 2066.*

The species figured in *Mycographia* (fig. 90), under the name of *Peziza pluvialis*, is clearly the above. Sowerby's figure is not good, and the impression it conveys is very different from the character of his specimens, which Mr. W. Phillips has since examined in the Rev. M. J. Berkeley's Herbarium. On the faith of both these mycologists we, therefore, withdraw the name of *Peziza pluvialis* in favour of *P. domestica*.

**Peziza (Humaria) eclecta.** *Berk. & Cooke.*

Scattered or subgregarious, yellow externally, with a few scattered septate hairs; disc concave; asci cylindrical; sporidia elliptical, even; paraphyses linear, slightly clavate at the tips.

On the ground. Sibbertoft (M. J. B.). Shrewsbury (W. Phillips).



Cups about 2-3 m.m. broad ; sporidia  $\cdot 018 \times \cdot 01$  m.m. Clearly not referable to any of the species figured in "*Mycographia*," but closely allied to *Peziza ascoboloidea*. Mont.

***Peziza (Sarcoscypha) cocotina*. Cooke.**

Rooting, fleshy, hemispherical, then flattened ; disc orange externally, as well as the rooting stem white, clad with a dense short snowy-white tomentum ; asci cylindrical ; sporidia elliptic, even ; paraphyses clavate.

On cocoa nut fibre in a caterpillar cage. Epping. J. English. Oct., 1876.

A very beautiful species. Allied to *P. radiculata*, Sow., but different ; cups clad externally with a snow-white pubescence. About 1 inch across. Sporidia  $\cdot 018 \times \cdot 01$  m.m.

***Peziza (Sarcoscypha) crucipila*. C. & Ph. *Mycographia*, fig. 237.**

Scattered, sessile, fleshy, scarlet, soon flattened ; externally paler, clad with forked or cross-shaped pallid hairs ; asci cylindrical ; sporidia elongated, elliptical ; paraphyses clavate above, orange.

On the ground. Shrewsbury (W. Phillips).

Cups 1-2 m.m. broad ; sporidia  $\cdot 02 \times \cdot 009$  m.m.

***Peziza (Tapesia) rhabdosperma*. B. & Br. *Ann. N.H.*, No. 1621, t. x., f. 6.**

Subiculum, thin, tomentose, pale, tawny ; cups scattered, of the same colour, externally darker, villose ; margin inflexed ; hymenium brighter ; asci lanceolate, obtuse ; sporidia filiform.

On dead wood. November. Leigh Down.

Sporidia  $\cdot 003$ - $\cdot 0035$  in. long.

***Peziza (Dasyscypha) fuscescens*. P. *Fr. Sys.* ii., 95.**

Stipitate, tawny ; cups hemispherical, subglobose when dry, externally clad with bay-brown hairs ; asci subclavate ; sporidia linear, obtuse ; paraphyses filiform.—B. & Br. *Ann. N.H.*, No. 1622.

On beech leaves. S. Wales.

Sporidia  $\cdot 01$  m.m. long.

***Peziza (Mollisia) Tripolii*. B. & Br. *Ann. N.H.*, No. 1623.**

Described as *Peziza ulcerata*, P. & P., in *Grevillea* iv. p. 222, pl. 62, fig. 5.

On dead stems of *Aster tripolium*.

***Peziza (Mollisia) punctoidea*. (Karst.)**

Gregarious, sessile, or substipitate ; cups naked, convex ; plane when dry, hyaline, white ; asci cylindrical, clavate, sporidia minute. *Helotium punctoideum*. Karst. *Myc. Fenn.* p. 151. Karst. *Sym.* p. 215.

On dead leaves of *Epilobium*. Dinmore.

Cups scarce  $\frac{1}{4}$  m.m. broad ; sporidia  $\cdot 004$ - $\cdot 005 \times \cdot 002$ - $\cdot 003$  m.m.

We have referred our specimens for the present to Karsten's species, of which we have seen no specimens. The fruit hardly accords, otherwise it agrees very well with his description.

**Helotium Laburni.** *B. & Br. Ann. N.H., No. 1624.*

Shortly stipitate; cups externally villose, furfuraceous, pallid; margin inflexed; disc ochraceous, bright coloured; sporidia fusiform, quadri nucleate.

On decorticated branches of laburnum, or beneath the cuticle, which it seems to throw off.

Sporidia  $\cdot 0009$  in.

**Ascobolus (Ascophanus) ochraceus.** *Boud.*

Minute, pallid ochraceous, or ochraceous; disc minutely papillate; asci somewhat fusiform; sporidia ovate, oblong, smooth, hyaline; paraphyses simple, septate, simple or furcate, slightly thickened above, often curved.

On old cow dung. Shrewsbury.

Cups about 1 m.m. broad. Mr. Phillips concurs with me in considering this to be the species described by Crouan and Boudier. Sporidia  $\cdot 016 \times \cdot 009$  m.m.

We have also found two other species which require further investigation and consideration.

**Stictis lecanora.** *Schn. & Kze. var. pyri, B. & Br. Ann. N.H. sub. 1624, t. xi., f. 7.*

Disc quite black.

On bark of pear trees. Shrewsbury.

Sporidia  $\cdot 0004$ – $\cdot 0005$  in.

**Ascomyces Alni.** *B. & Br. Ann. N.H. No. 1628.*

Deforming the inflorescence; sporidia numerous in each ascus, small.

On female catkins of alder.

Sporidia  $\cdot 0002$ – $\cdot 0003$  in.

**Ascomyces pruni.** *Fekl. Fungi Nass. p. 29.*

Sporidia ovate or irregular; asci subclavate, obtuse, distorting the fruit on which it occurs.—*B. & Br. Ann. N.H., No. 1629.*

On plum and sloe.

**Nectria Keithii.** *B. & Br. Ann. N.H. No. 1625.*

Perithecia minute, pallid, crowded, furfuraceous; ostiolum distinct; sporidia fusiform, inarticulate; conidiophores punctiform, confluent, greyish, flesh colour.

On cabbage stalks. Forres.

Sporidia  $\cdot 0002$ – $\cdot 00025$  in long; conidia  $\cdot 0002$  in.

**Nectria caulina.** *Cooke.*

Nestling beneath the epidermis; perithecia single, brown, submembranaceous, gregarious, small; asci subclavate; sporidia 16, cylindrical, curved, obtuse, pale brown.—*Cooke, Fungi Britt. ii., No. 479.*

On stems and twigs of *Buxus*. Forden (J. E. Vize).

Very different from any form of *Nectria Rousselliana*. Sporidia sixteen in each ascus,  $\cdot 018 \times \cdot 006$  m.m.

**Sphæria (Byssisedæ) Keitii.** *B. & Br. Ann. N.H. No. 1626, t. xi., f. 8.*

Perithecia cæspitose, seated upon black branching flocci; apex

rose-coloured, with a punctiform impressed ostiolum, and radiated; sporidia fusiform, triseptate, constricted at the division, each cell with a large nucleus.

On a piece of cord. Glasnevin Botanic Garden.

Sporidia  $\cdot 0012 \times \cdot 00025$  in.

**Sphæria Empetri.** *Fr. Sys. ii.*, 522.

Gregarious or scattered, innate, black, at first smooth and shining, afterwards flattened and rugose; ostiolum papillate; sporidia linear, uniseptate, pale brown.—*B. & Br. Ann. N.H.*, No. 1627.

On leaves of *Empetrum nigrum*.

Asci  $\cdot 002$  in. long, sporidia pale brown, linear, uniseptate,  $\cdot 007$  in. long.

**Sphæria (Sordaria) curvula.** var. **aloides.** *Winter, Sordarien*,  
p. 38.

*Sordaria aloides*, Fckl. *F. Rhen*, No. 2549.

Perithecia crowned with three or four tufts of erect bristles.

On cow dung. Shrewsbury.

**Sphæria (Obtectæ) applanata.** *Niessl.*

Perithecia scattered or sparsely gregarious, covered by the epidermis, minute, rounded, flattened, umbilicate at the apex, papillate, dark brown; asci cylindrical; sporidia oblong, obtuse, uniseptate, constricted, upper cell a little inflated.—*Didymosphæria applanata*, Niessl, *Hedwigia*, 1875, p. 149.

On raspberry canes. Worcester. Edwin Lees, Esq., F.L.S.

Sporidia  $\cdot 016 \times \cdot 005\text{--}\cdot 006$  m.m.

**Sphæria (Diaporthe) Epilobii.** *Fckl. Sym. Myc. p.* 206.

Stroma very thin, effused, subcortical, black; perithecia nestling beneath the bark, depressed, black; ostiola papillæform, very minute; asci cylindrical; sporidia oblong-ovate, attenuated towards each end, uniseptate, quadrinucleate, hyaline.

On stems of *Epilobium*. Dinmore.

Sporidia  $\cdot 01 \times \cdot 005$  m.m.

**Sphæria (Diaporthe) Labiata.** *Cooke.*

Immersed in the blackened stem, loosely gregarious; ostiola long, erect, spiniform; asci clavate; sporidia narrowly lanceolate, uniseptate, nucleate.

On stems of *Prunella*. Dinmore.

There are such minute differences in many of the species of this group *Diaporthe*, that a critical revision will soon become an absolute necessity.

Sporidia  $\cdot 01\text{--}\cdot 012$  m.m. long.

**Sphæria (Diaporthe) Vincæ.** *Cooke. Fungi. Britt. ii.*, No. 493.

Perithecia immersed, occupying definite spots, circumscribed by a black line; ostiola papillate, scarcely elongated; asci subclavate; sporidia lanceolate, quadrinucleate.

On stems of *Vinca*. Forden.

Sporidia  $\cdot 02\text{--}\cdot 022$  m.m. long.

**Sphæria (Diaporthe) orthoceras.** *Fr. El.* ii., 97.

Perithecia immersed, seriate, globose, persistent black; ostiola straight, somewhat conical; sporidia oblong-fusiform, uniseptate, nucleate, hyaline.—*Fckl. Sym. Myc.* p. 209. *Cooke, Fungi Britt.* ii., No. 500.

On stems of *Senecio*. F'orden.

Sporidia  $\cdot 012 \times \cdot 004$  m.m.

**Sphæria (Gnomonia) graphis.** *Fckl. F. Rhen.* No. 2016.

Perithecia scattered, globose, olivaceous, with a long erect straight ostiolum; asci elliptic, stipitate; sporidia cylindrical, curved, at length septate, hyaline.—*Fckl. Sym. Myc.* p. 122.

On leaves of *Rubus fruticosus*. Nesscliffe. Oct. 1876.

The perithecia are much smaller than in *Sphæria gnomon*, and but just visible under a lens. Only two or three leaves were found during the Cryptogamic Excursion of the Caradoc Club.

**Rhytisma empetri.** *W.*

Ambient, black, shining, wrinkled longitudinally; asci cylindrical.—*B. & Br. Ann. N.H.*, No. 1630.

On *Empetrum nigrum*. Rannoch. N. Wales, 1866.

**Capnodium citri.** *B. & Desm.*

Stratum thin; peridia elongated, mostly acuminate, conical or lageniform; mycelium consisting of beautifully reticulate branched moniliform threads; sporidia minute, oblong, sometimes attached end to end.

On leaves of oranges. Exeter (E. Parfitt).

## FUNGI ON WHALE BONES.

FUNGI UPON BONES.—The occurrence of fungi upon animal matter is always interesting to the mycologist, whether the matrix be living or dead. About a year ago a young whale was stranded near Lynn, and in due course the bones passed into the possession of a manure company. They have been exposed all the time to the weather, and during the spring and summer were covered abundantly by an orange *Fusarium*, as well as by certain moulds. The skull has been sawn in two, and from a crack in it sprang, during the autumn, a cluster of *Agarics*, very near, if not identical with, *A. bullaceus*, *Fr.*, the main points of difference being the cæspitose habit, and the margin of the pilei becoming striate or even corrugated, as the plants dried. A few days ago, in the very centre of the cranium a cluster of *Agaricus ostreatus*, *Jacq.*, made its appearance, apparently luxuriantly, upon a thin stratum of dry cerebral matter that lined the interior of the cavity.

CHARLES B. FLOWRIGHT.

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## CALIFORNIAN FUNGI.

Collected by H. W. HARKNESS, M.D., by CHARLES B. PLOWRIGHT.

In July last I received a parcel of fungi from Dr. Harkness, mostly Sphæriacei, which had been collected by him near San Francisco, together with a few specimens from the Sierra Nevada Mountains, at an elevation of 5000 feet. Most of them are referable to European, and even British species: so that their interest is in the locality from which they are derived, rather than from any special rarity in the species themselves.

*Solenia ochracea*, Hoffm.. On oak bark. No. 125, 154.

*Cytispora fugax*, Fr. = *Spermogonia* of *Valsa salicina*, Fr. On willow bark. No. 115.

*Sporidesmium lepraria*, B. & Br. with some *Corticium*, on oak bark. No. 140.

*Tubercularia vulgaris*, Tode. On locust bark. No. 66. On *Rhus toxicodendron*. No. 134.

*Peziza villosa*, Pers. On dead twigs. No. 109.

*Peziza cinerea*, Batsch. On bramble. No. 103.

*Stictis Berkeleyana*, Du. R. & Lév. On sticks. No. 91.

*Nectria coccinea*, Fr. On bark. No. 56.

*Nectria cucurbitula*, Fr. On fir bark. No. 86.

*Nectria peziza*, Fr., On bark of lupins. No. 106.

*Nectria episphaeria*, Fr. On some *Diatrype*. No. 1.

*Xylaria hypoxylon*, Grev. On bark. No. 75. On oak. Nos. 101, 102, 119, 150, 457 and 344. Nos. 411 and 416 from the Sierra Nevada.

*Hypoxylon malleolus*, B. & Rav. On oak. No. 121.

*Cucurbitaria confluens*, n. sp. Perithecia at first immersed, becoming prominent, conical, frequently confluent, covered by a very fine black down, connected by an inconspicuous stroma. Sporidia brown, muriform, constricted in the middle, about 30 micromills long, by 12 mk. thick. No. 435. On oak bark, from the Sierra Nevada Mountains.

*Sphaeria aquila*, Fr. On oak. Nos. 3 and 84.

*Sphaeria submoriformis*, n. sp. Perithecia irregular, rugose, bursting through the cuticle, variable in size. Sporidia biseriate, hyaline, simple, curved, 20-23 mk. long, by 3 mk. wide. On dead bark. No. 83. This has much the appearance of *Sp. moriformis*, Tode, but differs in habit and in the sporidia being uniseptate, and little more than half the size of those of that species.

*Sphaeria herbarum*, Pers. On dead weeds. No. 164, 168.

*Sphaeria rostellata*, Fr. On brambles. No. 103.

No. 418 is *Ozonium auriconium*, Link., from the Sierra Nevada. Nos. 170 and 345 are *Cytisporæ*. On oak bark. No. 363 is a *Ozhoma*, 133 a *Diplodia*, 123 a *Nemaspora*, and No. 43, 112, 114 & 155, are not in a condition to be recognised. No. 162 is without fruit, but appears to be *Valsa ambiens*, Fr.

## PRIORITY OF NAME.

A misconception seems to be current amongst some botanists that a MS. name in a private herbarium, or the description of a new species printed in a report which is circulated privately, or printed only for the use of a public department, is sufficient to establish priority for that species. In order to establish any claim for priority, we hold that the species must be *published*, either by the circulation of specimens in published fasciculi, or by description in some work accessible to the public. A privately, or exclusively, printed report which is not sold or published, is no security for priority of name.

We hold that unless a name or description is so published that it is accessible to botanists, its author cannot claim for it any other right than that of a manuscript name. It is presumed that if a description is *published* it is known, or might be known, to all botanists, but such presumption cannot be extended to names or descriptions *privately* printed; for acquaintance with which no facilities are afforded either by purchase or otherwise. We are assured that we are only expressing the general view of this subject which is recognised by all European Naturalists. It would be manifest injustice to expect Naturalists to respect names with which they cannot possibly become acquainted through the ordinary channels of scientific literature. The first *published* name, when accompanied by a sufficient diagnosis for the identification of a species, has recognised priority. Had not this plain doctrine been ignored or controverted, we should not have considered such an explanation necessary.

M. J. BERKELEY,  
R. BRAITHWAITE,  
M. C. COOKE.  
J. M. CROMBIE,  
F. KITTON.

## CARRINGTON'S BRITISH HEPATICÆ.\*

The fourth part of this work is before us, and although the work proceeds slowly, it gives promise of ultimate completion. There are four plates, but we cannot enumerate the species, since the names are not attached; this, we would suggest, is a mistake, since, for reference, it is always most convenient to have the name with the figure. The species described in this part are *Plagiochila exigua*, Tayl., *Mylia Taylora*, G. & B., and its two subspecies, *Scapania nemorosa*, Dumort., *Scapania resupinata*, Dumort., *Scapania æquiloba*, Dumort., *Scapania Bartlingii*, N. ab. E., and *Scapania curta*, Dumort. From this it would appear

\* "British Hepaticæ," by B. Carrington, M.D., F.R.S.E. Part IV. London: Hardwicke and Bogue.

that the letterpress is in arrear of the plates. It is sincerely to be hoped that Dr. Carrington will be induced to proceed forthwith with the work, and complete that which he has so well commenced, and which no one is more competent to bring to a satisfactory conclusion.

### CRYPTOGAMIC DAY OF THE "CARADOC."

The "Caradoc" Club constituted its annual excursion "a day devoted specially to Cryptogamic Botany," and though content to follow the "Woolhope" at a humble distance, there is no reason why the Shrewsbury meeting should not hereafter become a day of remembrance for Cryptogamists. The two devotees of Fungology who took part in the excursion, expressed themselves well satisfied with the new, or rare, acquisitions they made during the day.

### CONSPECTUS OF THE GENERA OF BRITISH LICHENS, ACCORDING TO THE MORE RECENT NYLANDERIAN ARRANGEMENT.

By THE REV. J. M. CROMBIE, F.L.S.

During the past few years Dr. Nylander has from time to time given indications in the Flora and other Lichenological Opuscula of various alterations and emendations on his former systematic arrangement of Lichens. As this classification (previously kindly communicated to myself *in litt.*) has now been so far published in two recent Lichenological brochures, viz., "Index lichenum hyperboreorum," by Dr. Stizenberger, and "Flora Kareliæ Onegensis," Part II., by M. J. P. Norrlin, it may be of service to British Lichenists that I here give an outline of its main features in so far as relates to the genera of the Lichen-Flora of our own Islands.

#### Family I.—BYSSACEI.

|                          |     |     | Genera.            |
|--------------------------|-----|-----|--------------------|
| Tribe I. Sirosiphei      | ... | ... | { Sirosiphon, Ktz. |
|                          |     |     | { Gonionema, Nyl.  |
|                          |     |     | { Spilonema, Born. |
| Tribe II. Pyrenopsei     | ... | ... | { Euopsis, Nyl.    |
|                          |     |     | { Pyrenopsis, Nyl. |
| Tribe III. Homopsidei... | ... | ... | Ephebe, Fr., Born. |

#### Family II.—COLLEMACEI.

|                       |     |     |                       |
|-----------------------|-----|-----|-----------------------|
| Tribe I. Lichinei     | ... | ... | { Lichina, Ag.        |
|                       |     |     | { Pterygium, Nyl.     |
|                       |     |     | { Leptogidium, Nyl.   |
| Tribe II. Collemei    | ... | ... | { Synalissa Dk., Nyl. |
|                       |     |     | { Collema Ach. Nyl.   |
|                       |     |     | { Leptogium Ach. Nyl. |
| Tribe III. Pyrenidiei | ... | ... | { Collemopsis, Nyl.   |
|                       |     |     | { Pyrenidium, Nyl.    |



Family III.—LICHENACEÆ.

|                            |   |                            |   |                         |
|----------------------------|---|----------------------------|---|-------------------------|
| Series I.<br>EPICONIOIDEI. | { | Tribe I. Caliciei... ..    | { | Sphinctrina, Fr.        |
|                            |   |                            | { | Calicium, Ach.          |
|                            |   |                            | { | Stenocybe, Nyl.         |
|                            |   |                            | { | Coniocybe, Ach., Nyl.   |
|                            |   |                            | { | Trachylia, Fr.          |
|                            |   | Tribe II. Sphærophorei ... | { | Sphærophoron, Pers.     |
|                            |   |                            | { | Gomphillus, Nyl.        |
|                            |   | Tribe III. Bæomycetei ...  | { | Bæomyces, Pers.         |
| Series II.<br>CLADONEI.    | { | Tribe IV. Pilophorei ...   | { | Pilophoron, Tuck.       |
|                            |   | Tribe V. Stereocauli ...   | { | Stereocaulon, Schreb.   |
|                            |   |                            | { | Pycnothelia, Ach. Duf.  |
|                            |   | Tribe VI. Cladoniei ...    | { | Cladonia, Hffm. Nyl.    |
|                            |   |                            | { | Cladina, Nyl.           |
|                            |   | Tribe VII. Roccellei ...   | { | Roccella, DC.           |
|                            |   | Tribe VIII. Siphulei ...   | { | Thamnolia, Ach.         |
| Series III.<br>RAMALOIDEI. | { | Tribe IX. Usneei ...       | { | Usnea, Hffm.            |
|                            |   | Tribe X. Alectoriei ...    | { | Alectoria, Ach. Nyl.    |
|                            |   | Tribe XI. Ramalinei ...    | { | Ramalina, Ach. Fr.      |
|                            |   |                            | { | Cetraria, Ach. Nyl.     |
|                            |   | Tribe XII. Cetrariei ...   | { | Platysma, Hffm. Nyl.    |
|                            |   |                            | { | Evernia, Ach. Nyl.      |
|                            |   | Tribe XIII. Parmeliei ...  | { | Parmelia, Ach., Nyl.    |
|                            |   |                            | { | Parmeliopsis, Nyl.      |
|                            |   |                            | { | Stictina, Nyl.          |
| Series IV.<br>PHYLLOIDEI.  | { | Tribe XIV. Stictei ...     | { | Sticta, Ach., Nyl.      |
|                            |   |                            | { | Ricasolia, Dn.          |
|                            |   |                            | { | Nephromium, Nyl.        |
|                            |   | Tribe XV. Peltigerei ...   | { | Peltidea, Ach., Nyl.    |
|                            |   |                            | { | Peltigera, Hffm., Nyl.  |
|                            |   |                            | { | Solorina, Ach.          |
|                            |   | Tribe XVI. Physciei ...    | { | Physcia, Nyl.           |
|                            |   | Tribe XVII. Gyrophorei ... | { | Umbilicaria, Hffm.      |
|                            |   |                            | { | Gyrophora, Ach.         |
|                            |   |                            | { | Pannaria, Del.          |
|                            |   | Tribe XVIII. Lecanorei ... | { | Coccocarpia, Pers.      |
|                            |   |                            | { | Amphiloma, Fr., Nyl.    |
|                            |   |                            | { | Dirina, Fr.             |
|                            |   | Tribe XIX. Pertusariei ... | { | Pertusaria, DC.         |
|                            |   |                            | { | Phlyctis, Wallr.        |
|                            |   | Tribe XX. Thelotremai ...  | { | Thelotrema, Ach.        |
|                            |   |                            | { | Urceolaria, Ach., Nyl.  |
|                            |   |                            | { | Lecidea, Ach., Nyl.     |
| Series V.<br>PLACODEI.     | { | Tribe XXI. Lecideei ...    | { | Odontotrema, Nyl.       |
|                            |   |                            | { | (Schizoxylon, Pers.)    |
|                            |   |                            | { | Xylographa, Fr., Nyl.   |
|                            |   |                            | { | (*Ptychographa, Nyl.)   |
|                            |   |                            | { | Agyrium, Fr., Nyl.      |
|                            |   |                            | { | Lithographa, Nyl.       |
|                            |   |                            | { | Opegrapha, Ach., Nyl.   |
|                            |   | Tribe XXII. Graphidei ...  | { | Platygrapha, Ach., Nyl. |
|                            |   |                            | { | Stigmatidium, Mey.      |
|                            |   |                            | { | Arthonia, Ach.          |
|                            |   |                            | { | Graphis, Ach.           |
|                            |   |                            | { | Chiodecton, Ach.        |
|                            |   |                            | { | Glyphis, Ach.           |
|                            |   |                            | { | Melaspilea, Nyl.        |

|                            |     |                               |   |                         |
|----------------------------|-----|-------------------------------|---|-------------------------|
| Series VI.<br>PYRENODEI.   | {   | Tribe XXIII. Pyrenocarpei ... | { | Normandina, Nyl.        |
|                            |     |                               |   | Endocarpon, Hedw., Nyl. |
|                            |     |                               |   | Verrucina, Nyl.         |
|                            |     |                               |   | Verrucaria, Pers., Nyl. |
|                            |     |                               |   | Thelenella, Nyl.        |
|                            |     |                               |   | Thelopsis, Nyl.         |
|                            |     |                               |   | Obryzum, Wallr.         |
|                            |     |                               |   | Strigula, Fr.           |
|                            |     |                               |   | Melanotheca, Fée.       |
|                            |     |                               |   | (Astrothelium, Eschw.)  |
|                            |     | Tribe XXIV. Peridiei ...      | { | Thelocarpon, Nyl.       |
|                            |     |                               |   | Rimularia, Nyl.         |
|                            |     |                               |   | Endococcus, Nyl.        |
|                            |     |                               |   | Mycoporum, Flot.        |
|                            |     |                               |   |                         |
| (Family IV.—MYRIANGIACEI.) |     |                               |   |                         |
| Tribe I. Myriangiei        | ... | Myriangium, Mnt. & Berk.      |   |                         |

It will be perceived that the above Conspectus has been drawn up in the same form as that given by Nylander in the Introduction to his *Syn. Lich.* and *Lich. Scand.*, which is admirably suited to show the arrangement at a single glance. The classification thus proposed will be found, I think, on due examination, to be the most philosophical and natural of any yet propounded. The subdivision of these genera into "subgenera" and "sections," some emendations upon which have also been indicated by Nylander in the *Flora*, &c., will be found in detail in my forthcoming "Catalogue of British Lichens, including those in Herb. Brit. Mus."

## ATLAS DER DIATOMACEEN-KUNDE.

### PARTS IX. AND X.

We have received the above parts of the "Atlas." Some delay has arisen in their publication, partly arising, we believe, from the ill-health of the author. Part IX. and one plate of Part X. contain the following figures of species belonging to the genera *Aulacodiscus* :—

- Aulacodiscus scaber*, Ralfs.  
 „ *decorus*, Greville (?) var.  
 „ *Sollittianus*, Norman.  
 „ *Möllerii*, Grunow, n. sp.  
 „ *Orientalis*, Greville.  
 „ *Oreganus*, Bailey.  
 „ (?) *amœnus*, var. Greville.  
 „ (?) *angulatus*, Greville.  
 „ *affinis*, Grunow, n. sp.  
 „ *Stoschii*, Janisch, n. sp.  
 „ *Petersii*, Ehr. var (?).  
 „ „ type nach, Kitton.

- Aulacodiscus circumdatus*, Schmidt, n. sp.  
 „ *formosus*, Arnott.  
 „ *inflatus*, Greville.  
 „ *quadrans*, Schmidt, n. sp.  
 „ *Johnsoni*, Arnott.  
 „ *Ehrenbergii*, Janisch (nach Kitton=*A. Kittoni*, Arnott).  
 „ *Kittoni*, var.  
 „ *Kittoni* = *A. lævis*, Brightwell.  
 „ *Brightwelli*, Janisch.  
 „ *excavatus*, Schmidt, n. sp.  
 „ *sparsus*, Greville (perhaps *A. Beeveriae*, Johnson).  
 „ *Comberi*, Kitton (This is an error; Arnott is the author.)  
 „ *probabilis*, Schmidt, n. sp.  
 „ *suspectus*, Schmidt, n. sp.  
 „ *septus*, Schmidt, n. sp.  
 „ *margaritaceus* and vars.  
 „ sp. (?)  
 „ sp. (?)  
 „ sp. (?)

The five plates contain sixty-four figures, representing twenty-nine species. These figures, although faithful likenesses, scarcely do justice to this beautiful genus. Figure 14, Tafel 33, *A. Mollerii*, is probably *A. Crux*, of Ehrenberg, see Microgeologie, Tafel xviii., fig. 47.\* We have found this form with four and five processes. Figure 6 Tafel 34 is doubtless the same form, with four processes. The figures of *A. Petersii* and its variety† are too faint; the figure of the latter is much inferior to that given in the specimen plate. Of *A. formosus* we have two figures—one enlarged to 200 diameters—but like *A. Petersii* var. is too faint; the second represents a portion of a valve magnified 600 diameters, but does not shew the markings between the granules. These figures will easily enable the student to recognise the species, but they do not give a good idea of the beauty of this form. *A. circumdatus* appears to us to be only a form of *A. Petersii*. *A. Johnsonii*—this is the form figured in the Quekett Journal, No. 31, p. 149, by Mr. Cottam, as *A. africanus*, n.s. It differs somewhat from the form found in the Algoa Bay guano. *A. Ehrenbergii* is the same as *A. Kittoni*. *A. Brightwellii* is only *A. Kittoni*, with six processes. Herr Janisch, in his “Zur Charakteristik des Guanos von Verschiedener Fundorten,” p. 15, says—“*A. Brightwellii*, C. J., wie

\* This form was found in the “Richmond deposit,” and is identical with that occurring in the “Nottingham deposit,” the form in Tafel xxxv. a. xvi., fig. 2, found in Peruvian guano, and is doubtless the same as *A. cruæ*, Janisch = *A. scaber*, Ralfs.

† This variety is probably the same as *A. Macraeanus*, Greville (Trans. Micro. Soc., Vol. x. n.s., pl. 2, fig. 4).

*A. Ehrenbergii* jedoch mit 6 halbkugelförmigen Erhöhungen—Eine ähnliche form mit 8 halbkugelförmigen Erhöhungen hat Brightwell im Lond Mikr Journal, Vol. viii., pl. v. fig. 13, als *A. Kittoni*, beschrieben und abgebildet." (Mr. Brightwell's figure was afterwards found to be taken from a very thin four-rayed frustule, the processes of the under valve being nearly in focus with those of the upper.) The synonymy of this species is as follows:—*Aulacodiscus Kittoni*, Arnott = *A. lævis*, Brightwell. This name he deleted in the following number of the Journal. Vol. viii., page 139, and adopted Dr. Arnott's) = *A. Ehrenbergii*, Janisch = *A. Brightwellii*, Janisch. *A. Kittoni* var  $\alpha$  = *A. Africanus*, Cottam (?) *A. Kittoni* var.  $\beta$ . = *A. Johnsoni*, Arnott.

Plate 38, Part x., contains the following figures (24) of *Asteromphalus* :—

|                      |   |
|----------------------|---|
| <i>Asteromphalus</i> | <i>elegans</i> , Ralfs.   |
| „                    | <i>arachne</i> , Bieb.  |
| „                    | <i>Ralfsianus</i> , Naman & Grunow.                                     |
| „                    | <i>flabellatus</i> , Bieb.  |
| „                    | <i>Cleveanus</i> Grunow) = <i>A. Wallichianus</i> ,<br>Cleve nec Grev.) |
| „                    | <i>Roperianus</i> , Grev.   |
| „                    | <i>Darwini</i> , Ehr.   |
| „                    | <i>Shadboldtianus</i> , Grev.   |
| „                    | <i>Humboldtii</i> , Ehr.  |
| „                    | <i>Brookei</i> , Bailey.  |
| „                    | <i>Moronensis</i> , Grev.   |

*A. Cleveanus* is an oval form not at all resembling *A. Wallichianus*, Grev. Cleve describes it as finely punctate, but the markings are not shewn in Schmidt's figure.

Plates 39 and 40 are occupied with figures (74) of various species of *Amphora* ; the most beautiful of these is, perhaps, *A. rhombica*, Kitton, most correctly delineated.

Since writing the above, I have received a letter from Professor H. L. Smith (no mean authority on the Diatomaceæ) in reply to one of mine on the African *Aulacodiscus* (*A. africanus*), in which I stated my conviction of that form being merely a var. of *A. Kittoni*. He says, "I quite agree with you about *Aulacodiscus*."

F. KITTON, Hon. F.R.M.S., Norwich.

## CRYPTOGAMIC SOCIETY OF SCOTLAND.

This society, at the last moment, resolved upon holding its second annual meeting at Killin, instead of Kelso, during the same week as the Hereford meeting. Under these circumstances, therefore, it could hardly be expected that English Mycologists would be found crossing the border as last year, and, as the report of the proceedings intimates, it was a "quiet" meeting, with small pretensions, and no very prominent results.

## LICHENOLOGICAL MEMORABILIA. No. 10.

By the REV. W. A. LEIGHTON, B.A., Camb., F.L.S., F.B.S.Ed., &c.

*On the Lichens of Fishguard, Pembrokeshire.*

Fishguard is a small town on the north coast of Pembrokeshire, midway between Cardigan and St. David's, distant from each about 16 miles. It consists of an upper and lower town; the upper placed on a lofty headland of Llandeilo slates, having the strata almost vertically uplifted. This formation encompasses the entire south side of Fishguard Harbour and Goodwick Bay, and forms also the southern bank of the river Gwaine, a celebrated trout stream, which flows many miles through a finely wooded valley into Fishguard Harbour. At the base of this abrupt headland lies the lower town surrounding the small sheltered Harbour, whose opposite side forms another headland of metamorphosed Caradoc Sandstone, called Fort Hill, from a ruined fort erected in 1797 after the landing of the French. About a mile to the west of Fishguard, and on the lower level with Fishguard Harbour, is the little village of Goodwick, with its beautiful sandy beach and magnificent bay lying N.E. and S.W., and opening into Cardigan Bay. This picturesque village nestles at the base (with south aspect) of Pen Cow, the lofty extremity of a range of low hills of Caradoc Sandstone, which extends as far as St. David's, the summit broken at intervals into isolated protruded masses of rocks. This ridge skirts the north side of Goodwick Bay, whilst the south is surrounded by the Llandeilo Slates of Fishguard, and the Caradoc Sandstone of Fort Hill, and the remarkable headland of Dinas Head. Fishguard Harbour opens at right angles to Goodwick Bay. A fortnight in September, 1876, spent in this picturesque locality not only invigorated health with its bracing air and fresh breezes, but afforded, especially on the Llandeilo Slates, a plentiful supply of Lichens, many rare, some new, and all interesting, as extending our knowledge of the distribution of lichens over our islands. I venture, therefore, to send you the following enumeration:—

**Sirospion.**—Stone walls on River Gwaine, near Fishguard.

**Lichina confinis.** AG.—Goodwick Bay.

**Bæomyces rufus.** DC.—Llanachar Bridge.

**Ramalina polymorpha.** ACH.—Fort Hill, near Fishguard.

**Peltigera horizontalis.** (L.)—River Gwaine.

**Peltigera malacea.** ACH.—Manoerowen, near Fishguard.

**Stictina fuliginosa.** (DICKS.)—Manoerowen.

**Parmelia caperata.** (L.)—Pen-y-rhiw, near Fishguard.

**Parmelia olivacea,** var. **prolixa.** ACH.—Fort Hill.

- Parmelia conspersa**, f. **stenophylla**. ACH.—Fort Hill.
- Parmelia lævigata**. (SM.)—Pen-y-rhiw.
- Physcia parietina**. (L.)—St. David's.
- Physcia obscura**. (EHRH.)—Saxicole, Manoerowen.
- Physcia aquila**. (ACH.)—Goodwick Bay.
- Squamaria saxicola**, var. **versicolor**. (PERS.)—St. David's, rare.
- Placodium callopismum**, var. **plicatum**. WEDD.—Fishguard Harbour and St. David's.
- Lecanora squamulosa**, f. **smaragdula & simplex**.—Fishguard Harbour.
- Lecanora fuscata**. (SCHRAD.)—Fishguard Harbour.
- Lecanora atra**. (HUDS.)—Goodwick Bay.
- Lecanora argopholis**. (WHLNB.)—Fort Hill.
- Lecanora polytropa**. (EHRH.)—Fort Hill.
- Lecanora subfusca**, f. **argentata & coilocarpa**.—Fishguard Harbour and Goodwick Bay.
- Lecanora galactina**, & f. **dispersa**. (PERS.)—Fishguard Harbour.
- Lecanora calcarea**. (L.)—Goodwick Bay.
- Lecanora glaucoma**. (HFFM.)—Pen Cow, near Fishguard. A very beautiful state.
- Lecanora ferruginea**, & f. **festiva & saxicola**.—Goodwick Bay and St. David's.
- Lecanora arenaria**. (PERS.)—Fishguard Harbour. Very rare.
- Lecanora sophodes**, f. **metabolica**.—Goodwick Bay.
- Lecanora atrocinnerea**. (DICKS.)—Fort Hill. Very rare.
- Lecanora erysibe**. (ACH.)—Goodwick Bay. Rare.
- Pertusaria ceuthocarpa**. (SM.)—Pen-y-rhiw. Rare.
- Lecidea Salweii**. (BORR.)—Pen Cow. Very rare.
- Lecidea atrorufa**. (DICKS.)—Fort Hill.
- Lecidea intumescens**. (FLOT.)—Fort Hill and St. David's.
- Lecidea protrusa**. FR.—Manoerowen and Newport Road.
- Lecidea enterochlora**. TAYL.—Fishguard Harbour.
- Lecidea coarctata**, f. **involuta**.—Fishguard Harbour.
- Lecidea lithophila**. ACH.—Newport Road.
- Lecidea fuscoatra**, f. **fumosa**.—Fort Hill, Pen-y-rhiw, and Newport Road.
- Lecidea Tylori**. (SALW.)—River Gwaine, Fishguard Harbour, and Goodwick Bay.
- Lecidea contigua**, f. **calcarea**.—Manoerowen.
- Lecidea confluens**.—Pen-y-rhiw. Rare.

**Lecidea consentiens.** NYL.—Goodwick Bay. Rare.

**Lecidea verruculosa.** (BORR.)—Llanachar Bridge.

**Lecidea stellulata.** TAYL.—Curious confluent and dispersed forms. Fort Hill and Goodwick Bay.

**Lecidea chalybeia.** BORR.—An ecrustaceous state. Fishguard Harbour and Goodwick Bay.

**Lecidea colludens.** NYL.—Pen Cow.

**Lecidea cyrtella.** ACH.—Saxicole. Goodwick Bay. Rare.  
(See observations on *Lecanora Hutchinsiae*, below.)

**Lecidea biformigera.** LEIGHT.—Pen-y-rhiw. Rare.

**Lecidea Oederi.** ACH.—Fort Hill.

**Lecidea endoleuca.** NYL.—On *Ulex Europæus*. Fort Hill.  
Rare.

**Lecidea phacodes**, f. **chlorotica.** ACH.—On *Thymus serpyllum* and on *Ulex Europæus*. Fort Hill. Rare.

**Lecidea effusa**, var. **inundata.** FR.—Fishguard Harbour.

**Lecidea pelidna.** ACH.—Newport Road. Very fine.

**Lecidea petræa.** (WULF.)—Goodwick Bay, Pen Cow, Newport Road.

**Lecidea concentrica**, var. **excentrica.** ACH.—Pen Cow.

**Lecidea concreta.** WAHL.—Llanachar Road.

**Graphis Ruiziana.** FÉE.—On hawthorn. Llanachar Road.  
Very rare.

**Opegrapha atra**, f. **hapalea.** ACH.—On elder. River Gwaine.  
Rare.

**Opegrapha saxicola**, var. **Chevallieri.** LEIGHT.—Simple and conglomerate forms. Goodwick Bay. Most abundant.

**Stigmatidium crassum.** DUB.—Fishguard.

**Arthonia varians.** (DAV.)—Fort Hill, Pen Cow.

**Verrucaria halophila.** NYL.—Goodwick Bay. Rare.

**Verrucaria maura.** WHLNB.—Fishguard Harbour, Goodwick Bay, St. David's. Abundant.

**Verrucaria nigrescens.** (PERS.)—Fishguard Harbour and Goodwick Bay.

**Verrucaria viridula.** (SCHRAD.)—Most abundant on walls and rocks. Fishguard Harbour, Goodwick Bay.

**Verrucaria rupestris.** (SCHRAD.)—Goodwick Bay.

**Verrucaria conformis.** NYL.—On elder. River Gwaine, and on *Ulex Europæus*. Fort Hill.

**Verrucaria sublitoralis.** LEIGHT.—Goodwick Bay. Most abundant.

**Verrucaria chlorotica.** (ACH.)—Goodwick Bay, Fishguard Harbour. f. *subintegra*, NYL., Manoerowen. Rare. f. *carpineae*, SCHÆR., on *Calluna vulgaris*, Pen Cow.

**Verrucaria olivacea.** BORR.—On sycamore. River Gwaine. Very rare.

**Verrucaria erratica.** (MASS.)—On *Lecidea geographica*. Fort Hill.

**Phacopsis varia.** TUL.—A fungus, in fine condition, parasitic on *Parmelia saxatilis*. Pen-y-rhiw.

The following may be, perhaps, considered worthy of a more extended notice:—

**Lecidea myriocarpa.** DC.—var. *Saxicola*. An interesting series occurred in various places on the rocks, which may be defined thus:—

1. forma **areolata.** LEIGHT.—*Cinerascent*, thin, effuse, *minutely rimoso-areolate*, *areolæ plane*; apothecia black, numerous, crowded, adnato-sessile, plane; margin slightly prominent, thickish and paler, eventually obliterated; excipulum lateral, nigro-fuscous, short; hypothecium central nigro-fuscous; paraphyses distinct, coherent, apices very large, nigro-fuscous or nigricant; spores 8, fuscous, oblong, 1-septate, small; gelatina hymenea, I violet.

Spores .012-.014 m.m. long, .006-.007 m.m. broad. The thallus has no reaction with K or C, but when C is applied after being wet with K, a singular whitish effervescence ensues. The hypothecium is a nigro-fuscous central mass, separated from the nigrofuscous lateral excipulum by a pale interval.

Goodwick Bay! Not common.

2. forma **leprosa.** LEIGHT.—*Albido-cinerascent*, areolæ dissolved into a *leprose, pulverulent*, effuse condition.

Exs.—Zw. 127, Leight. 181, Mudd 189.

Cliffriigg! Yorkshire, Mr. Mudd. Haughmond Hill! Shropshire, Goodwick Bay! Newport Road! near Fishguard, Pembroke-shire.

3. forma **ecrustacea.** LEIGHT.—*Thallus* nearly or quite *evanescent and obliterated*, leaving the numerous minute *apothecia naked* and prominent.

Ashington Common! Sussex, Mr. Borrer, Cliffriigg! Yorkshire, Mr. Mudd, near Kilcully, Cork! Mr. Carroll, Haughmond Hill! Sharpstones Hill! Lyth Hill! Longmynd! Shropshire. Goodwick Bay! St. David's! Pembrokeshire.

Intermediate states were often observable connecting the above forms. Externally f. *ecrustacea* resembles *L. dispansa*, NYL., but the different spores prevent confusion. According to specimens received years ago from Mr. Borrer, as occurring with his true *L. prominula*, on flints on the Sussex Downs, this form would appear to be the lichen mentioned by him in E. Bot. Suppl.,



t. 2687, as probably "true *L. lygæa*, Ach." It should be remembered that Mr. Borrer determined his lichens by external characters alone, the confirmatory character of the spores being at that time scarcely thought of.

I may here mention a fourth form collected in 1872 :—

4. forma **opegraphina**. LEIGHT.—Thallus obliterated; *apothecia coacervate into gyrocarpous or opegraphine minute clusters*.

This form is precisely similar to that mentioned in Leight. Brit. Graph., p. 12, t. 5, f. 6 a. b.

Anglesea ! *Rev. Hugh Davies*, North Cliff, Tenby ! (1872), Cwm Ffynnon lloer ! Nant Francon.

**Lecanora Hutchinsiae**. NYL.—Goodwick Bay. Rare. (K—C—). This beautiful lichen has been found hitherto only in Ireland and in Jersey. The spores are variable in size, and resemble a good deal those of *Lecidea cyrtella*, Ach., but that lichen may be recognized by the disk of the apothecium, when moistened with K, becoming pale and transparent, and surrounded by a thin external dark circumferential ring.

**Lecanora helicopsis**. WHLNB.—The spores of this very rare lichen resemble those of *Verrucaria gemmata*, Ach. It has only been found once before in Ireland, and now occurs very sparingly in Goodwick Bay.

**Lecidea mesoidea**. NYL.—This curious lichen occurs very sparingly in Goodwick Bay. It has been once before found in the Channel Islands. The remarkable hypothecium well distinguishes it, consisting of a dark stratum immediately under the pale hymenium, then a large middle stratum of a pale reddish hue, which is subtended by a basal dark stratum.

**Lecidea parellaria**. NYL.—Parasitic on *Lecanora parella* (L.), plentiful on the stone walls of the Road, Fishguard to Llanachar, and at Manoerowen, near Fishguard. This was originally discovered in France, and this year (1876) by Mr. LARBALÉSTIER in the West of Ireland.

And the following, which are believed to be new species :—

**Lecidea impressula**. LEIGHT.—Llanachar Bridge. My Herbarium contains this also, from near Dolgelley.

**Lecidea imponens**. LEIGHT.—Parasitic on *Lecanora polytropia*. Fort Hill.

**Lecidea tephrizans**. LEIGHT.—Llanachar Bridge.

**Lecidea ryssolea**. LEIGHT.—Fort Hill.

**Lecidea glaucomaria**. LEIGHT.—Parasitic on *Lecanora glaucoma*. Goodwick Bay.

**Odontotrema majus**. LEIGHT.—On drift-wood, Goodwick Bay. Distinguished from *O. minus* and *O. longius* by the size of the

spores. This I possess amongst the Arctic American Lichens of Sir John Richardson, and it has also been found on old willow stumps at Hencote Pool, near Shrewsbury, and in Gloucestershire.

**Verrucaria pertenuis.** LEIGHT.—Differing from *V. chlorotica* in the attenuated acicular 3-septate colourless spores.

**Verrucaria fumosaria.** LEIGHT.—Parasitic on *Lecidea fusco-atra*, f. *fumosa*. Pen Cow.

**Verrucaria neottizans.** LEIGHT.—Parasitic on *Bæomyces rufus*. Llanachar Bridge.

## WOOLHOPE ANNUAL.

The annual Fungus Foray of the Woolhope Club has taken place, under circumstances the most unfavourable, but with results little inferior to the best of former occasions. The weather so unpropitious for outdoor work, reduced the show of fungi to much smaller dimensions than usual, but the attendance at the meetings, and the interest in the proceedings was unabated. The entire week from September the 25th to the 30th was devoted, under the spirited guidance of Dr. Bull, to mycological pursuits. A detailed account, from the vigorous pen of Mr. Worthington Smith, in the "Gardeners' Chronicle," renders it unnecessary to repeat the particulars here, therefore we shall restrict our own observations to the purely scientific aspect of the week. The study of the *Cortinari* was selected as the most special object of the meeting, but the unfavourable weather prevented any considerable effort being made to collect illustrations of this difficult group. Of the additions made to the British Flora, the most important is that of *Cortinarius saginus*, Fr., which, though not collected at the Club Excursions, was found before and after, by the indefatigable Dr. Bull. Drawings of this elegant species were sent to Upsal for the opinion of Professor Fries, and were determined by him as the species above named. A sketch was also exhibited at the show of an interesting little *Cortinarius*, which Fries pronounces a form of *C. dilutus*, but very different in aspect from the general character of that species, and hereafter it may probably take rank as distinct.

A cluster of *Pholiota*, found at Dinmore, became the subject of some diversity of opinion, which Fries has decided by describing it as a new species in the current number of this journal.

Among the rarities may be mentioned *Agaricus autochthonus*, B. & Br., *Agaricus cyphellæformis*, B., *Agaricus balaninus*, P., and *Agaricus togularis*, Fr., the latter brought by Mr. C. B. Plowright, from Kings Lynn.

The microscopic species, which are rather collateral than prominent objects of interest with the Woolhope Club, were augmented

by a little white *Peziza*, on leaves of *Epilobium*, probably the *Helotium punctoideum*, Karst., *Sphæria* (*Diaporthe*) *Epilobii*, Fekl., *Sphæria* (*Diaporthe*) *Labiatae*, C., *Uromyces Scrophulariæ* (Lib.), described as a *Puccinia*, but only possessing unicellular spores, and some other species not so uncommon.

One suggestion made during the course of the present meeting, seems to be in fair way of realization. It was proposed that the Woolhope Club should seek to acquire, as a specialty, a good collection of drawings, both originals and copies, of fungi of all kinds, but specially of the Hymenomycetes. It was urged that no where in this country can be found a good collection of figures of Agarics, notwithstanding that figures are so essential for their discrimination, and that, if such a collection were formed, it would constitute an additional claim which Hereford would furnish for the augmentation of these annual meetings of the Mycologists. It remains to be seen with what readiness the appeal for drawings, which the Woolhope Club makes to Mycologists, will be responded to. Those who have derived so much pleasure from the annual meetings of the Club, have now an excellent opportunity for practical testimony of their gratitude, which no "good man and true" will permit to pass unheeded.

Another suggestion we purpose ourselves to endeavour to carry out, which consists in the publication of coloured figures of the least known *Agaricini*, from time to time, in this journal, in the hope that, though accomplished at an additional cost, this will, in a measure, be compensated by an increased sale.

One other suggestion relates to the printing of a pocket list of *Hymenomycetes*, for field work, to be undertaken by co operative means. The details of the plan will be found on the cover of the present number of this journal.

Altogether there was a general feeling of satisfaction with the meeting and its results, notwithstanding the drawbacks which were beyond control.

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# Grevillea,

A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY  
AND ITS LITERATURE.

## NEW JERSEY FUNGI.

By M. C. COOKE and J. B. ELLIS.

(Continued from p. 55.)

**Dacrymyces deliquescens.** *Fr.*—On white cedar pole (*Cupressus thyoides*). No. 2445.

**Nematelia** sp.—On *Rubus*. Newfield, N.J.

Insufficient to determine satisfactorily.

No. 2476.

**Badhamia irregularis.** *C. & E.*

Sparsa, sessilis. Peridiis suborbicularibus, vix confluentibus, demum atro-brunneis; sporis fuscis, globosis, asperulis.

On Jersey pine in a fence.

Not in good condition, and insufficient for a satisfactory diagnosis. Spores rough, .01 mm. diam., united 4-12 together, hence laterally compressed, and not so freely separating as in many species; colour of spores in the mass nearly that of *Lycoperdon pyriforme*.

No. 2448.

**Sphæropsis valsoideum.** *C. & E.*

Peritheciis in pustulas congestis (2-3) subconfluentibus; epidermide cinctis, atris, lævis; sporis ellipticis, brunneis.

Accompanying *Dothidea moricola* (No. 2471), on *Morus*.

Spores .015-.018 × .0075 mm.

A *Tubercularia* on the same twigs, and both may be connected with the *Dothidea*.

No. 2474.

**Sphæropsis fibrisedum.** *C. & E.*

Peritheciis gregariis, immersis; ostioli brevi emergentibus; sporis longe ellipticis, brunneis.

On *Rhus venenata*, decorticated branches.

Perithecia immersed, covered by the fibres of the wood; short ostiola alone emergent; spores .025-.03 × .01 mm. No. 2467.

**Sphæropsis Caryæ.** *C. & E. in Grevillea.*—On husk of Hickory nut.

Not specifically distinct from the species formerly described under the above name.

No. 2450.

**Melanconium bicolor.** *Corda* *lc.*—On red and white oak.

Spores .012 × .006 mm. It is a very distinct variety, but the spores are of the usual form and dimensions.

No. 2170.

**Sporidesmium aurantiacum.** *B. & C. in Grevillea.*—On naked maple. A very curious species. No. 2303.

**Sporidesmium polymorphum.** *Corda.*

On *Morus*. Nos. 2437, 2447.

On oak. Nos. 2290, 2429.

**Sporidesmium hysteroideum.** *C. & E.*

Hysteriiforme. Sporis pyriforme vel obovatis, 1-3 septatis, longitudinaliter divis, brunneis.

On bleached maple.

Scattered over the wood like an *Hysterium*, erumpent. Spores  $\cdot 015\text{--}\cdot 018 \times \cdot 01\text{--}\cdot 012$  mm., clear, brown; septa distinct. No. 0430 is an early stage of the same thing. Rather an aberrant species; the spores spring from a brown stroma. No. 2428.

**Epicoccum scabrum.** *Corda.*

Spores large, rough,  $\cdot 035$  mm. diam.

On pine lately sawn and packed close. No. 2440.

**Sporocybe byssoides.** *Fr.*—On dead stems of *Bidens*.

No. 2424.

**Helminthosporium macrocarpum.** *Grev.*—On dead black oak limbs. No. 2432.

**Septosporium maculatum.** *C. & E.*

Maculaeforme. Floccis erectis, flexuosis, septatis; sporis clavatis, interdum apiculatis, 5-7 septatis, hinc illic longitudinaliter divis, brunneis.

On bark of *Magnolia glauca*.

Forming definite black spots on the bark nearly an inch in length. Spores variable,  $\cdot 03\text{--}\cdot 04$  mm. long; pedicels hyaline.

No. 2427.

**Cercospora concentrica.** *C. & E.*

Maculis griseis. Floccis fasciculatis, in pustulas circinantibus congestis, elongatis, flexuosis, simplicibus, septatis; sporis cylindraceis, rectis vel curvulis, 3-5 septatis.

On leaves of *Yucca filamentosa*.

Seated on orbicular or elliptical greyish spots. Erumpent, forming circinating pustules, which split the cuticle in a stellate manner; threads amber-coloured, flexuous, rather highly developed, densely crowded together; spores variable, at length 3-5, or more, septate,  $\cdot 05\text{--}\cdot 07$  mm. long.

No. 2150.

**Gonytrichum caesium.** *Nees.*—On *Morus*. Near Malaga, N.J. November, 1876. No number.

**Rhinotrichum repens.** *Preuss in Sturm Deutsch Flora.*—On fallen trunk of an old apple tree.

Not differing from specimens published by Fuckel, except in rather more highly developed threads. Spores  $\cdot 02 \times \cdot 012$  mm.

No. 2455.

**Leotia lubrica.** *P.*—On old sandy charcoal beds. No. 2434.

No. 2290, on oak, is a species of *Peziza* allied to *P. fusca*, but entirely barren.

**Peziza vinosa.** A. & S.—On bark of *Vitis vinifera*. Asci .04 mm. long. No. 2461. On *Morus*. Asci .05 mm. long. No. 2449; On *Rubus*. Tips of the paraphyses exhibit a swelling, and tendency to become capitate. Asci .045 mm. long. This variety closely resembles in fruit *Pez. auricolor*, Blox. No. 2462.

**Peziza rufula.** Schw. (?)—On old oak log.

Cups do not change colour when dry, but remain of a bright scarlet. Asci much shorter than usual in *P. rubella* and *P. vinosa*, .025 mm. Probably the species intended by Schweinitz. No. 2463.

**Peziza (Mollisia) luctuosa.** C.—On *Polygonum*.

Apparently this species, but as there is no fruit it is impossible to state positively. No. 2442.

**Patellaria ferruginea.** C. & E.

Orbicularis, ferruginea, ad margine obscurior, convexo-plana. Asci clavatis; sporidiis lanceolatis, obtusis, 1-3 septatis, rectis, vel curvulis, luteolis; paraphysibus linearibus, furcatis.

On stems of herbaceous plants.

Resembling *Patellaria rhabarbarina*. Cups about  $\frac{1}{2}$  mm. broad; sporidia .025-.03  $\times$  .008 mm. No. 2384.

**Dermatea cucurbitaria.** C.

Sporidia large, fenestrate, brown, .03-.035 mm. long.

On *Morus*.

No. 2459.

**Cenangium urceolus.** A. & S.—Under the loose bark of dead *Clethra*.

Probably this species in poor condition.

No. 2443.

**Stictis pupula.** Fr.—On *Morus*. Malaga, N.J.

Sporidia as long as the ascus, at least one-fifth of a millimètre. No. 2446.

**Stictis fimbriata.** Schw.—On fir cones.

Well compared by Schweinitz to some species of *Æcidium*—a neat little *Stictis*. Cups not more than one-fifth of a millimètre in diameter; sporidia immature, apparently filiform.

No. 2464.

**Propolis grisea.** C. & E.

Gregaria, immersa, orbicularis, ellipticave, plana; margine brunneo; disco pallide-griseo; ascis cylindraceutis; sporidiis filiformibus.

On white cedar.

About 1 mm. broad, sometimes more; sporidia filiform, .1 mm. long. No. 2473.

**Propolis lobata.** C. & E.

Immersa, orbicularis, convexo-plana; disco melleo; margine prominente, lobato; ascis clavatis, stipitatis; sporidiis ellipticis.

On maple lying on the ground.

About 1 mm. broad; margin lobate, connivent when dry; disc honey colour; sporidia elliptic, .02  $\times$  .008 mm. No. 2444.

**Triblidium minor.** C.—On *Morus*.

Rather more matured than previous specimens ; sporidia sometimes 5 septate, becoming brown. No. 2460.

**Hysterium Gerardi.** C. & P.—On old peach tree limbs.

No. 2477.

**Sporomega cladophila.** Dby.

Sporidia filiform, length of the ascus.

On *Vaccinium corymbosum*. No. 2452.

**Sporomega Andromedæ.** Duby.—On *Andromeda*.

Probably this species, but without fruit. It more resembles *Colpoma* than the other species of *Sporomega*. No. 2435.

**Nectria** sp.—On *Andromeda*.

Stylospores only ; straight, narrowly elliptic, binucleate, about .01 mm. long and one-fourth as broad. It would be injudicious to name the species, without perfect fruit. No. 2469.

**Hypoxyton perforatum.** Schwz.—On wood.

Characterised by the white ostiola.

No. 2454.

**Diatrype asterostoma.** B. & C.—On *Morus*. Malaga, N.J.

Probably this species, but very old and in bad condition.

No. 2439.

**Diatrype corniculata.** Ehr.—On branches. Near Vineland, N.J. No. 2451.

**Valsa Clethræcola.** C. & E.

Peritheciis (5-8) magnis, collis una erumpentibus ; ascis cylindraceis ; sporidiis biglobosis, brunneis, uniseptatis.

On *Clethra alnifolia*.

Sporidia uniseptate, .018 × .009 mm., each cell nearly globose, brown. No. 2436.

**Valsa præstans.** B. & C. in *Curtis Catalogue*?—On *Nyssa*. New Jersey (Ellis).

Sporidia .01-.012 mm. long. It is probably *V. præstans*, B. & C., but having seen no specimen we are unable to affirm definitely. No. 2425.

**Valsa Juglandina.** C. & E.

Peritheciis paucis (3-5) ad basim niveo-pulverulentis ; ostiolis prominentibus, profunde sulcatis ; ascis lanceolato-clavatis ; sporidiis allantoideis.

On *Juglans regia*. New Jersey (Ellis).

Certainly not *S. juglandicola*, Schwz. ; the pustules are not at all linear. Sporidia .01-.012 × .003 mm. ; ostiola large, prominent, and deeply sulcate. No. 2421.

**Valsa rugiella.** C. & E.

Peritheciis (10-20) minutis, in pustulis orbicularibus congestis ; ostiolis leniter sulcatis ; ascis lanceolatis ; sporidiis exiguis, allantoideis.

On *Acer rubrum*. New Jersey (Ellis).



With the habit of *V. tetraploa*, but with smaller sporidia than any other of the sulcate species. Sporidia  $\cdot 005$ - $\cdot 006$  mm. long, pale amber. No. 2426.

**Valsa** sp.

The spermatia of some *Valsa*, under the epidermis of oak bark (*Quercus coccinea*). No. 2388.

In No. 2334 the perithecia only contain sausage-shaped stylospores, growing on delicate branched threads.

In No. 2336 the perithecia contain myriads of minute spermatia which issue in a gelatinous mass. No names can be given to these imperfect fungi.

**Sphæria (Diaporthe) Euspina.** C. & E.

Effusa, in stratum nigrifactum immersa; collo elongato; ascis clavatis; sporidiis lanceolatis, uniseptatis, quadrinucleatis.

On *Chenopodium*.

Sporidia uniseptate, quadrinucleate,  $\cdot 018 \times \cdot 003$  mm., closely resembling *Sphæria spiculosa*. No. 2475.

**Sphæria (Diaporthe) Salviæcola.** C. & E.

Effusa vel sparsa; peritheciis globosis, immersis; collo elongato; ascis clavatis; sporidiis arcte lanceolatis, quadrinucleatis.

On stems of *Salvia*.

Perithecia usually immersed in a blackened stroma; necks elongated, but soon broken off; sporidia  $\cdot 015$  mm. long, with four nuclei. No. 2400.

**Sphæria (Denudatæ) arctespora.** C. & E.

Gregaria. Peritheciis globosis ad basim applanatis, scabrosis, atris; ascis cylindræis; sporis arcte, ellipticis, brunneis.

On *Andromeda*, inside the bark.

Perithecia rough, with the projecting external cells, nearly  $\cdot 01$  mm. in length; sporidia  $\cdot 015 \times \cdot 004$  mm. No. 2479.

**Sphæria botryosa.** Fr.—On decorticated *Morus*. Malaga, N.J.

Mixed with *Dinemasporium hispidulum*, and growing with *Dothidea moricola*. Asci filled with numerous linear bodies resembling spermatia. No. 2472.

**Sphæria pulveracea.** Ehr.—On *Liquidambar*.

Accompanied by rostrate perithecia, containing long, narrow, clavate stylospores, borne in clusters on branched threads; also one or two perithecia of a *Sphæria*, with large brown fenestrate sporidia, probably *S. obducens*, Fr. No. 2470.

**Sphæria (Denudatæ) millegrana.** Schw.—On *Liquidambar*.

Sporidia elliptical, brown. No. 2458.

**Sphæria submoriformis.** Plovrr.—On unknown twig (W. T. Haynes).

Sporidia sausage-shaped, hyaline. No. 2441.

**Sphæria (Pertusæ) deerrata.** C. & E.

Sparsa. Peritheciis erumpentibus, paucis, globosis, atris; ascis cylindræis; sporidiis uniseriatis, ellipticis, brunneis.

On Red Cedar.

Sporidia  $\cdot 012 \times \cdot 007$  mm. The few scattered small perithecia, some of them contain stylospores resembling a *Sphaeropsis*. They are also accompanied sparsely by a small species of *Monotospora*, with globose spores ( $\cdot 02$  mm. diam.), furnished at the base with a hyaline apiculus.

No. 2478.

**Sphaeria (Immersæ) surrecta.** *Cooke, in Grevillea V.*

Sporidiis triseptatis, torulosis, brunneis,  $\cdot 025 \times \cdot 008$  mm.

On old poplar board.

Apparently not differing from British specimens on old pine railings.

No. 2468.

**Sphaeria (Obtectæ) thuridonta.** *C. & E.*

Sparsa. Peritheciis epidermide tectis, prominulis; ascis cylindraceis; sporidiis uniseriatis, ellipticis, brunneis, fenestratis; stylosporis obtuse biconicis, uniseptatis, brunneis.

On *Nyssa multiflora*.

Sporidia elliptic, constricted in the centre, 5 septate, with longitudinal divisions, brown,  $\cdot 025 \times \cdot 01$  mm. Accompanied by stylospores in other perithecia which are elliptic, uniseptate, brown,  $\cdot 04 \times \cdot 02$  mm.

No. 2431.

**Sphaeria (obtectæ) secreta.** *C. & E.*

Sparsa, epidermide tecta. Peritheciis brunneis, globosis, demum applanatis; ascis clavatis; sporidiis allantoideis, hyalinis.

Under the bark of deal *Viburnum*.

Wholly concealed, and only seen when the bark is stripped off, Sporidia sausage-shaped,  $\cdot 01$ - $\cdot 012$  mm. long.

No. 2327.

**Sphaeria (obtectæ) vexata.** *C. & E.*

Subgregaria, subimmersa, tecta. Peritheciis ovatis, atris; ascis clavatis; sporidiis hyalinis allantoideis; Stylosporis rectis, linearibus minutis.

On branches of *Andromeda ligustrina*.

Collected in patches, somewhat in lines, splitting the bark with the conical ostrola. Sporidia sausage-shaped  $\cdot 01$  mm. long. Stylospores in distinct perithecia with longer necks, minute, straight, linear,  $\cdot 005$  mm. long. The asci are not well matured, many of them containing only a granular peasma.

No. 2457.

**Sphaeria sepelibilis.** *B. & C. in Grevillea, No. 928.*

On *Smilax*. Newfield.

Sporidia elliptic, brown,  $\cdot 018 \times \cdot 008$  mm., nucleate.

No. 2253.

In No. 2456, on stem of old *Boletus*, the apparent perithecia contained neither asci nor spores.

**Sphaeria aliquanta.** *C. & E.*

Sparsa. Peritheciis applanatis, epidermide nigrifacta tectis; ascis breviter clavatis; sporidiis lanceolatis, quadrinucleatis, demum triseptatis, hyalinis, ad dissepimentis constrictis.

On *Smilax*.

Asci shortly clavate, almost saccate; sporidia sublanceolate, obtuse at the extremities, hyaline,  $\cdot 03$ - $\cdot 035 \times \cdot 01$  mm.; endo-

chrome thrice divided, constricted at the divisions, rarely with five divisions. The perithecia are flattened, with a distinct central pore, and a brown branching mycelium running under the cuticle, which covers the perithecia. There are also stellate, branched, creeping brown threads on the surface of the cuticle, resembling a minute *Asterina*, which bear triseptate brown conidia, of the same size and form as the sporidia. It is a very curious and interesting species. No. 2258.

**Sphaeria catariæ.** C. & E.

Minuta, gregaria, epidermide tecta. Ostioli papillæformibus; ascis clavatis; sporidiis ellipticis, acuminatis, biseriatis, uniseptatis, hyalinis.

On *Nepeta cataria*.

Sporidia  $\cdot 02 \times \cdot 008$  mm., uniseptate, but clearly not fully matured. Closely allied to *Sph. incommiscibilis*, B. & C. No. 2433.

**Dothidea venenata.** C. & E.

Erumpens. Pustulis parvulis, gregariis, convexo-planis, atris; epidermide fissuratis, cinctis; ascis clavatis, stipitatis; sporidiis amygdaloideis, hyalinis; microstylosporis ovalibus; macrostylosporis ellipticis, brunneis.

On *Rhus venenata*.

In some respects resembling *Melogramma ambiguum*, but the structure of the stroma is that of *Dothidea*, pustules much smaller; microstylospores oval,  $\cdot 008$  mm. long; macrostylospores  $\cdot 03 \times \cdot 01$  mm.; sporidia  $\cdot 045 \times \cdot 012$ - $\cdot 015$  mm. No. 2466.

**Dothidea moricola.** C. & E.

Erumpens, suborbicularis, planiuscula, atra; ascis late clavatis; sporidiis amygdaloideis, hyalinis.

On *Morus*. Malaga, N.J.

Sporidia amygdaloid,  $\cdot 025 \times \cdot 01$  mm., with somewhat the habit of *Dothidea Sambuci*. No. 2471.

**Massaria epileuca.** B. & C.

Macrostylospores lanceolate, obtuse at the ends, 5 septate, slightly constricted.

On *Morus*. Malaga, N.J.

Apparently the stylospores of this species,  $\cdot 08$ - $\cdot 09 \times \cdot 02$  mm., dark brown, ultimate cells small and paler. No. 2438.

**Erysiphe Montagnei.** Lév.—On leaves of Dandelion. Maine (W. C. Stevenson). No. 2453.

**Meliola fenestrata.** C. & E.

Subgregaria. Peritheciis subglobosis, brunneis, hinc illic sparse spinulosis; floccis ad basim radiantibus; spores ellipticis, multi-septatis, fenestratis, brunneis.

On scales of fir cones.

Spores  $\cdot 04 \times \cdot 012$  mm.; perithecia often quite smooth, sometimes with a few rigid subulate brown hairs, equal in length to the diameter of the perithecia. No. 2465.

## ON THE FORMATION OF THE SPORES IN LICHENS AND FUNGI.

The following interesting observations are translated from M. Edouard Strasburger's elaborate work, "Sur la formation et la division des Cellules," 1876.

According to the recent observations of M. Janczewski on *Ascobolus furfuraceus* (*Bot. Zeitung*, 1871, p. 258; *Ann. d. Sc. Nat.*, 5 s., tom. 15, p. 199), the young claviform ascus of this Discomycetes is filled with a protoplasm which strongly refracts the light, and of which the upper part is entirely destitute of vacuoles; it encloses a nucleus (*noyau*) slightly refractive, in the interior of which is a nucleolus (*nucléole*). Before the formation of the spores, the ascus elongates itself, then at a given moment the nucleus disappears, and suddenly the eight spores appear altogether. These spores commence by being small spherical masses of protoplasm slightly refractive, in the middle of which is a nucleus (*noyau*) provided with a nucleolus; these have not as yet a membrane, and in this state ammonia disorganizes them entirely. Later, when they have become of an oval form, they become covered with a membrane, which is at first very thin, and which iodine colours blue, as well as the membrane of the ascus, whilst the protoplasm of the spores and that which has not been used up in their formation, takes a yellow tint. This coloration does not continue thus; the protoplasm of the ascus placed around the spores exhibits gradually the reaction which characterises epiplasm, and becomes of a beautiful violet or a red-brown by the solution of iodine.

Although I have not verified these observations, still I concur in their accuracy, having myself observed the same phenomena in other plants.

According to the conjoint opinions of M. de Bary and M. Dippel, in certain Discomycetes, especially in the *Pezizæ*, as soon as the spores are produced, as I have said, there are formed in the ascus two smaller nuclei, instead of one primitive nucleus. In a more advanced state we see four nuclei, then eight, always of the same structure, but varying in size according to numbers. These last eight nuclei are placed at equal distances from each other, and eventually each of them is surrounded with a round mass of protoplasm, more transparent than the surrounding protoplasm, and limited by a very delicate outline. These masses of protoplasm, which arise simultaneously, are the first beginnings of spores, which speedily develop their cellular membranes, and increase in the interior of the asci, until they become doubled in size. In *Peziza pitya* the protoplasm, which at first surrounds them, is coloured yellow by iodine, like their interior protoplasm, and disappears rapidly during their growth. The protoplasm which surrounds the spores of *P. confluens* takes, on the contrary, the characters of epiplasm.

In the *Pyrenomyces* the ascus contains equally a nucleus, which is replaced by eight spores arising simultaneously, but destitute of nuclei.

M. Sachs notices an analogous fact in *Peziza convexula*. In the upper part of the ascus the protoplasm is accumulated in part around eight points, or ellipsoid masses. At first each of these masses is composed of a protoplasm, coarsely granulose, and surrounded by a clear aureole. Later, this aureole disappears, and each spore is well defined; its substance becomes more finely granular and clearer, whilst in its focus (*foyer*) a vacuole is formed, that is to say, a transparent drop of liquid. Eventually each spore becomes surrounded with a solid membrane, the vacuole disappears, and in the centre there is a large drop of very refractive oil, surrounded with numerous smaller drops of the same nature.

M. de Bary says, in another place, that whether the ascus contains less than eight spores, or a much greater number, fifty or more, these spores are always formed simultaneously. In the asci of *Tuber* we see at first a round globule of protoplasm, excentrically placed and coloured yellow by iodine, and around this protoplasm a parietal epiplasm, which is coloured of a red-brown by iodine. It is in this round mass of protoplasm that the spores arise. In reality, in its interior, one to three round cellules are formed, of the size of  $\frac{1}{300}$  to  $\frac{1}{150}$  mm., very vaguely limited, and only defined from the rest of the protoplasm by their feebler transparency.

Nevertheless, they quickly increase in size considerably, become clearly defined, and surrounded by a solid membrane. During the production of these primary spores, the outlines of other new ones are frequently seen, and before maturity the ascus contains many spores, all of which are in the same state of development. At this epoch of maturity only, the younger spores arrive at the same degree of perfectness as the older ones. We do not see any nucleus appear, either in the ascus before the formation of the spores, or in the spores themselves, whatever be their age.

An analogous phenomenon occurs in *Elaphomyces granulatus*. But here the protoplasm is arranged under the form of a thin parietal layer around one or more large vacuoles, so that the spores are produced near the wall of the ascus.

According to the observations of M. de Bary, the formation of the spores in Lichens, is, in all their phases, precisely similar to the genesis of the spores of the Ascomyceti; this is proved especially by this, that we are able, at least in certain cases, to observe in the asci the existence of a primary nucleus before the formation of spores.

According to my own special researches in *Physcia ciliaris* (L.), the primitive nucleus really exists, and is found in the upper portion of the claviform ascus before the production of the spores. The ascus is filled with a protoplasm nearly uniform in density, and possesses a thick and very turgescient wall. The nucleus is

spherical, especially dense and refractive in its upper part, as the examination of preparations preserved in alcohol demonstrates. The ascus augments in volume, the primitive nucleus disappears, and eight spores simultaneously arise in the superior part of the ascus. These spores approach each other closely, and absorb for their formation nearly all the superior protoplasm of the ascus. The spores appear complete. In the centre of each of them we observe a denser, although badly circumscribed spot. The young spores are at first solid, and surround themselves very rapidly with a colourless membrane of cellulose, which quickly increases in thickness. At the same time they increase in size, and their protoplasmic contents retire towards their walls. The denser, and at first central portion, which is an irregular or stellate granule, becomes equally parietal, and appears to be equivalent to a nucleus, for it immediately doubles (*dédouble*) itself, and displays between its two moieties a partition of protoplasm, by means of which the spore, which has become ellipsoid, is divided along its smaller axis, into two equal parts. But this nucleus is so small that we are unable to observe the details of its division. In the partition of protoplasm, there is formed at the same time, a new wall of cellulose, which speedily acquires a great thickness. The two small nuclei which generally are at first fixed near the new wall, cannot be distinguished from the other granular contents of the spores, until these acquire a greater age.

Finally, the membranes of the spores which have become bicellular, rapidly acquire a colour, which becomes deeper and deeper, from grey to brown. The small quantity of protoplasm which surrounds the spores becomes tinted always, by iodine, of a yellow-brown.

The development of the spores of *Physcia ciliaris* is conformable to that which may be observed in the asci of the *Calicieii* and *Sphærophorei*. Since in these instances the spores do not issue from the ascus, but the ascus divides itself into portions corresponding to the spores, these nevertheless do not arise from a division of the contents of the ascus, but rather from a free formation. These spores are arranged in a single longitudinal line, and from their first evolution employ nearly the whole of the contents of the mother cell; afterwards, as they increase in size, they arrange themselves one above another against the wall of the ascus, and often give to this wall an embossed or swollen appearance.

Nevertheless, we are able, now and then, by compression, to make the spores, when mature, issue from the ascus, and if the membrane of the ascus is not speedily visible, it is altogether owing to its extreme delicacy, and the refraction of light by the spores. With regard to the division into two of the spores of *Calicium trachelinum*, it is effected precisely as in *Physcia ciliaris*.

W.

## FUNGI BRITANNICI EXSICCATI.

(Continued from page 73).

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| <i>Valsa Beckhausi, Nke. (?)</i>        | . 672      |               |
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| <i>Valsa dissepta, Fr.</i>              | .          | 230           |
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## COCOA-PALM FUNGI.

By M. C. COOKE.

(Plate 86.)

Having received a cocoa-nut palm from Demerara, British Guiana, for examination, in order to ascertain, if possible, the cause of disease, I found several distinct forms of Fungi flourishing on the dead palm, which had not merely been a long time on the voyage, but was some weeks delayed here before it came into my hands. It will be observed that, although the fungi enumerated are in no way connected with the death of the palm, they are, some of them, of peculiar interest. Common moulds, and mycelioid conditions of imperfect fungi are not included.

**Physarum chlorinum.** *C.*

Sparsum vel gregarium. Peridiis parvis, sessilis, subglobosis, chlorino-viridis, simplicibus, stellato-fissuratis; sporis subglobosis, atris, opacis.

On dead woody portions of *Cocos nucifera*. Demerara.

Spores .008-.009 mm. diam. (Pl. 86, fig. 10.)

**Phoma cocoina.** *C.*

Sparsa. Peritheciis erumpentibus demum detectis, globosis, atris; sporis minutis, arcute ellipticis, hyalinis.

On old petioles of *Cocos nucifera*. Demerara.

Perithecia at first covered, at length exposed; spores .008 mm. long. (Pl. 86, fig. 4.)

**Sphæropsis palmarum.** *C.*

Erumpens. Peritheciis subglobosis, applanatis, demum superne detectis, atris; sporis ellipticis, hyalinis, intus granulosis.

On petioles and midribs of *Cocos nucifera*. Demerara.

Spores  $\cdot 02 \times \cdot 012$  mm. Perithecia rather large, splitting the cuticle. (Pl. 86, fig. 1.)

**Diplodia epicocos.** C.

Sparsa vel subgregaria. Peritheciis demum superficialibus vel semi-immersis, globosis, atris; sporis ellipticis, uniseptatis, constrictis, brunneis.

On dead young leaves of *Cocos nucifera*.

Spores  $\cdot 022 \times \cdot 01\text{--}\cdot 012$  mm.

Externally resembling a small *Sphæria* of the section *Denudatæ*. (Pl. 86, fig. 2.)

**Pestalozzia palmarum.** C. in *Grevillea*.

On dead leaves of *Cocos nucifera*. Demerara.

Spores  $\cdot 045 \times \cdot 006$  mm. (coloured portion) oozing out in persistent black tendrils. This species was first found on the dead sprout of germinating cocoanut from India. (Pl. 86, fig. 3.)

**Trichobasis palmarum.** C.

Soris minutis in maculas decoloratis, fuscis; sporis globosis, verrucosis, fuscis, ad basim hyalino-apiculatis.

On upper surface of leaves of *Cocos nucifera*. Demerara.

Spores  $\cdot 035\text{--}\cdot 04$  mm. diam., of a very peculiar structure, with a broad hyaline apiculus at the base, to which the peduncle is attached. (Pl. 86, fig. 9.)

**Memnonium palmicolum.** C.

Atrum, effusum. Spores globosis, magnis, opacis; hyphis repentibus, paucis, hyalinis, septatis.

On dead leaves of *Cocos nucifera*. Demerara.

Spores  $\cdot 015$  mm. diam., forming little black patches 1-2 inches in length. (Pl. 86, fig. 6.)

**Sporotrichum foliæcolum.** Lk.

On dead leaves of *Cocos nucifera*. Demerara.

Probably the above species, forming small white tufts on the dead leaves.

**Sphæria (obtectæ) cocogena.** C.

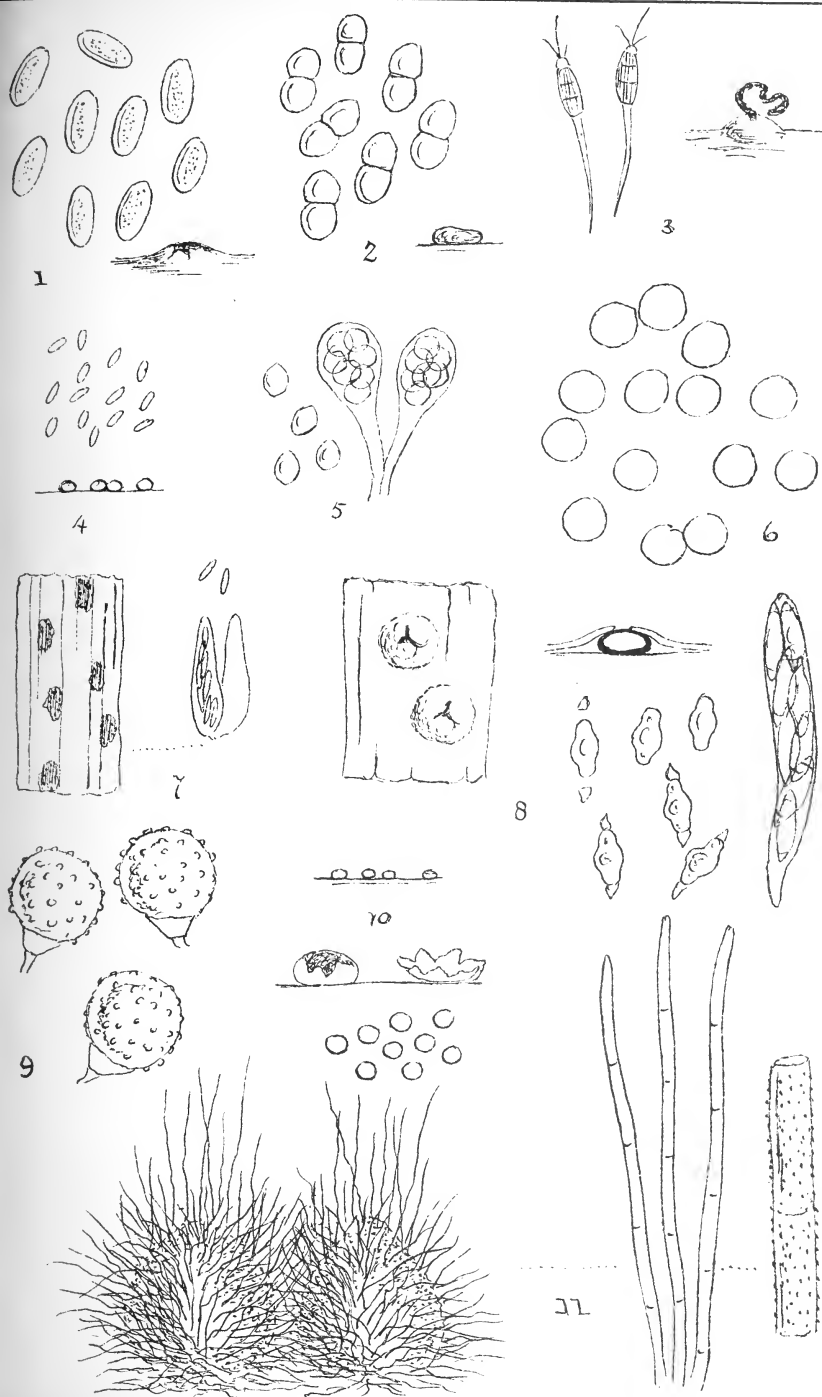
Gregaria. Peritheciis tectis, epidermide demum fissuratis, globosis, compressis, atris; ascis clavatis; sporidiis biserialibus, hyalinis, sub-ellipticis, tritorulosis, utrinque apiculato-appendiculatis.

On leaves of *Cocos nucifera*. Demerara.

Sporidia  $\cdot 02\text{--}\cdot 022 \times \cdot 01$  mm. without appendages; entire length  $\cdot 03$  mm. Very peculiar in structure, almost elliptical, twice compressed, swollen in the centre, so as to be tritorulose, each end furnished at first with a hyaline short appendage, which soon falls away. The sporidia would probably ultimately become biseptate. (Pl. 86, fig. 8.)

**Sphærella cocophylla.** C.

Hypophylla, gregaria. Peritheciis minutis, atris, tectis, epidermide nigrofacticis; ascis clavatis; sporidiis minutis linearibus, utrinque obtusis.





On leaves of *Cocos nucifera*. Demerara.

Sporidia scarcely .01 mm. long. Perithecia collected in small grey patches, sometimes circumscribed by a darker line. (Pl. 86, fig. 7.)

**Chaetomium orientalis. C.**

Gregarium, olivaceum. Peritheciis subglobosis, strigosis; pilis tenuis, simplicibus, flexuosis, brunneis; ascis pyriformibus, stipitatis; sporidiis globosis, utrinque leniter apiculatis, fuliginosis.

On cicatrices of trunk of *Cocos nucifera*. Demerara.

Sporidia .008-.01 mm. diameter. The dark olive perithecia are clustered on blackened spots, usually occupying the entire cicatrice of fallen leaves. (Pl. 86, fig. 5 to 11.) Hairs and the perithecia minutely scabrous.

## MUSHROOMS IN JAPAN.

The export of mushrooms amounts for the year 1875 to 1,461 piculs 77 catties, valued at 52,024 dollars; in 1874 the export was 1,603 piculs 31 catties, valued at 61,656 dollars; and 1,218 piculs 49 catties, valued at 34,170 dollars, were exported in 1873.

The best of the edible species of mushrooms are known as "matsu-také" and "shü-take." The difficulties attendant on preserving the former kind almost exclude them from the market for export; for not only do they decompose very rapidly, but even when successfully dried they are nearly tasteless, and thus useless in cookery.

The Shü-take species, however, have this peculiar excellence, that though they are all but tasteless in their raw state, when they are dried they have an extremely fine flavour.

The quantity that grows naturally on the decayed roots or cut stumps of the shü tree is not sufficient to meet the demand felt for them, consequently much skill has been brought to bear on their cultivation, notably by cutting off the trunks of the shü and other trees and forcing the growth of the mushroom on them.

The localities in which they are thus cultivated are Yamato, Isè, Mikawa, Yôtōmi, Suruga, Kai, Idzu, Hitachi, Mutsu and Dewa, Serano and Hida, Kü and Suwo.

These provinces produce the largest quantities; indeed, the quantity produced elsewhere is insignificant. Small parcels are produced in Zezo.

There appears to be no great difference between the wild and cultivated varieties of the shü-take mushroom, both being in taste and appearance very much the same, with this exception, that in the wild variety the upper surface is of a purplish brown colour, while the under surface and stalk are white; in the cultivated variety the shape is uneven and irregular.

Different varieties of oak appear to be the trees most in favour

with the Japanese for the cultivation of mushrooms; the tree known to natives as shû giving the best results. This tree grows abundantly in warm places having a south-easterly aspect; it attains to a height of about eighteen or nineteen feet. It has a long narrow leaf, thin and stiff, the front surface of a deep green colour, the back of a brownish tint and glazed. The tree is an evergreen, the fruit (acorn) small, with a rough cupule. The acorns are steamed and eaten. The wood of the tree is used in the making of boats' oars, also for fuel and charcoal.

Another oak, the kashiwa, from which mushrooms are obtained, is also plentiful in warm localities, and attains to a height of thirty or forty feet. The leaves are used in cookery, and the wood is in great demand for divining sticks for which it is considered the best.

The donguri, another species, is to be found all over the country; it grows to about eighteen or nineteen feet, has very thick branches and dense foliage; the leaf is slightly oval and slightly wrinkled. The fruit (acorn), after being pounded and steeped in water, is made into dumplings and eaten in this form. The wood is much used in boat-making and also for carts.

Mushrooms are obtained from any of the above in the following manner:—

About the beginning of autumn the trunk, about five or six inches in diameter, of any one of these trees, is selected and cut up into lengths of four or five feet; each piece is then split down lengthwise into four, and on the outer bark slight incisions are either made at once with a hatchet or the cut logs are left till the following spring, and then deep wounds seven or eight inches long are incised on them.

Assuming the first course to have been pursued, the logs, after having received several slight incisions, are placed in a wood or grove where they can get the full benefit of the air and heat. In about three years they will be tolerably rotten in parts. After the more rotten parts are removed they are placed against a rack in a slanting position, and about the middle of the ensuing spring the mushrooms will come forth in abundance. They are then gathered. The logs are, however, still kept, and are submitted to the following process. Every morning they are put in water, where they remain till the afternoon, when they are taken out, laid lengthwise on the ground, and beaten with a mallet. They are then ranged on end in the same slanting position as before, and in two or three days mushrooms will again make their appearance.

In Yenshin the custom is to beat the logs so heavily that the wood swells, and this induces mushrooms of a more than ordinarily large growth.

If the logs are beaten gently a great number of small-sized mushrooms grow up in succession. In places where there is a scarcity of water, rain water should be kept for steeping the logs in.

There is yet another plan. The cut logs are at once buried in the earth, and in a year's time are dug out and beaten in the manner as above described.

The mushrooms thus grown are stored in a barn on shelves ranged along three sides with braziers lighted under. Afterwards they are placed in small boxes, the bottoms of which are lined either with straw or bamboo mats. These boxes are then ranged on the shelves and all approaches carefully closed. An even degree of warmth is thus diffused. The boxes ranged on the upper or lower tiers are constantly changed so that the contents of each are thoroughly dried.

Another mode of drying is to string the mushrooms on thin slips of bamboos, which are piled together near the brazier; the heat is well kept in by inverting a closely woven basket over them.

Dried mushrooms are much esteemed in China, and they are also largely consumed by Japanese either as a dish by themselves or as a condiment with other dishes. Dried mushrooms retain their flavour for a great length of time, and thus bear transport to any distance very well.

Of other edible mushrooms in Japan beside the shü-take there is the kikurage, which grows in spring, summer, and autumn on the mulberry, the willow, and other trees. It is a small, thin, soft mushroom, very much curled at the edge, and of a brownish tinge; when dried in the sun the upper surface gets quite black, and the under surface a brownish grey. The flavour is somewhat insipid.

The iwatake, which grows on rocks in thick masses.

The so-take, a very delicately flavoured mushroom, to be found on precipitous crags, and consequently scarce, owing to the difficulties attendant on gathering it.

The kawa-take, to be found in shady spots on moorland; a funnel-shaped mushroom with a long hollow stalk.

*Report of H.M. Consul in Japan, 1875.*

N.B.—The Rev. M. J. Berkeley informs us that the 'shu-take' is a species of *Armillaria*, as far as he can judge from the only poor specimen which he has seen.—*Ed.*

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DE NOTARIS.—We regret to record the death of our old friend and correspondent, Guiseppe De Notaris, Professor of Botany in the University of Rome, who died 22nd January, 1877. Professor De Notaris published numerous works on different branches of Cryptogamic Botany, of which perhaps "*Briologia Italica*" is the largest. He is claimed as the founder of the modern school of Mycologists, advocating generic distinctions based solely on the fructification. If so, his followers go much farther than he would have thought of proposing.

## NEW BRITISH LICHENS.

*Communicated by the* REV. J. M. CROMBIE, F.L.S.

The following *new species*, recently gathered in Great Britain and Ireland, have been recorded by Dr. Nylander, in the "Flora" for 1876, pp. 572-578 :—

**1. *Lecanora subluta*.** *Nyl.*—Thallus effuse, whitish, minutely granulated; apothecia pale-testaceous, crowded; spores 0,010-12 mm. long, 0,005-6 mm. thick; hymeneal gelatine bluish, and then the thecæ tawny-violet with iodine. Scarcely more than a variety of *Lecanora galactina* Ach., from which it differs in the above characters. On dry rocks, Kylemore, Ireland (Larbalestier).

**F. *perspersa*.** *Nyl.*—Thallus less effuse; apothecia scattered (analogous to *L. dispersa*, Pers.). Along with the type at Kylemore.

**2. *Lecanora spodomela*.** *Nyl.*—Thallus greyish-brown, thin, opaque, subleprose, rimoso-diffract; apothecia blackish, with subentire thalline margin; spores 8 næ., colourless, ellipsoid, usually 1-septate, 0,011-16 mm. long, 0,006-7 mm., paraphyses slender, epithecium bluish; hymeneal gelatine bluish, and then violet with iodine. On sandstone rocks, near Kylemore, Ireland (Larbalestier). It belongs apparently to the section of *L. disparata*.

**3. *Lecidea arridens*.** *Nyl.*—Thallus white or whitish, very thin, plane, rimose, somewhat dispersed (K—, Ca. Cl.—); apothecia of a fine rosy-flesh colour, somewhat plane, immarginate, irregular, often with a spurious irregular white epithalline margin, internally concolorous with the disk; spores 8 næ., ellipsoid, simple, 0,014-18 mm. long, 0,007-0,010 mm. thick, paraphyses sufficiently slender, not crowded, perithecium with the epithecium and hypothecium colourless; hymeneal gelatine tawny wine-red with iodine. On decomposed rocks, near Lenane, Galway (Larbalestier). It belongs to the section of *L. coarctata*.

**4. *Lecidea paucula*.** *Nyl.*—Thallus greenish, very thin, smooth, continuous; apothecia livid-brown, minute, convex, immarginate, internally infuscate under the hymenium; spores 8 næ., ellipsoid, simple, 0,006-7 mm. long, about 0,003 mm. thick, paraphyses not discrete, epithecium colourless, hypothecium wholly brown; hymeneal gelatine tawny wine-coloured with iodine. On schistose mountainous rocks, Kylemore, Ireland (Larbalestier). This species belongs to the section of *L. botryoides*.

**5. *Lecidea thiopsora*.** *Nyl.*—Thallus sulphur-whitish, granulato-conglomerated, consisting of subpulvinate-concrescent granules (the pulvinuli somewhat plane, or variously confluent) K × yellow;



apothecia black, convex, often 2-4 connate, internally concolorous; spores 8 næ., bacillar or subacicular, thinly 3-septate, 0,022-30 mm. long, 0,0025-0,0035 mm. thick, paraphyses slender, not well discrete, hypothecium brown; hymeneal gelatine scarcely tinged with iodine, but the thecæ bluish, especially at the apices. On *Jungermannias*, near Kylemore, Galway (Larbalestier). This belongs, perhaps, to a distinct section.

**6. *Lecidea supernula*.** *Nyl.*—Thallus none proper; apothecia black, plane, slightly margined, or at length convex and immarginate, usually 3-6 aggregated, internally concolorous; spores 8 næ., colourless, oblongo-oviform, 1-septate, 0,009-0,014 mm. long, 0,004-5 mm. thick, paraphyses moderate, or nearly thickish, bluish-black at the clavate apices, hypothecium (and perithecium) bluish-black, above rubricose-red; hymeneal gelatine wine-red with iodine. Parasitic on the thallus of *Lecanora calcarea* var. *Hoffmanni*, on calcareous rocks, in the Island of Lismore, Argyleshire (Crombie). Allied to *L. arthoniza*.

**7. *Lecidea alumnula*.** *Nyl.*—Thallus white, thin, maculate or insulated, the insulæ somewhat sublobate (K—); apothecia black, subinnate, plane, margined, and often umbonate in the centre, internally concolorous; spores 8 næ., colourless, ellipsoid, simple, 0,009-0,012 mm. long, 0,005-6 mm. thick, paraphyses not discrete, epithecium and hypothecium with the perithecium blackish-brown; hymeneal gelatine bluish, and the thecæ wine-coloured with iodine. On the thallus of *Lecidea contigua* in a rivulet near Letterfrack, Galway (Larbalestier). It belongs to the section of *L. contigua*.

**8. *Lecidea perluta*.** *Nyl.*—Thallus glaucous-white, or ochraceo-glaucous, thin, continuous, rimose, apothecia rusty-reddish, or rusty-brownish, plane, margined, the margin usually paler, internally subconcolorous; spores 8 næ., colourless, ellipsoideo-oblong, murali-divided, 0,030-0,042 mm. long, 0,013-16 mm. thick, paraphyses slender, sufficiently regular, epithecium (in thin section) and perithecium reddish-yellow, hypothecium (at least in the centre) somewhat darkly reddish; hymeneal gelatine bluish, the thecæ dark tawny wine-coloured with iodine. On quartzose rocks, River Erriff, Galway (Larbalestier). Although the apothecia are biatorine, its systematic place is near to *Lecidea excentrica*.

**9. *Graphis ramificans*.** *Nyl.*—Thallus macular, whitish, sub-rugulose (K × yellowish, and then orange), apothecia dendroideo-ramose, black, naked, striatulate, slightly prominent; spores at length pale blackish, 10-12 locular, 0,032-45 mm. long, 0,008-10 mm. thick. On the bark of Holly, Connemara, Ireland (Larbalestier). Nearly similar to *Gr. striatula*, but distinguished by the dendroideo-branched apothecia.

**10. *Verrucaria dissepata*.** *Nyl.*—Thallus (if proper) greyish-whitish; with an ochraceous tinge, rimoso-areolate, thin; apothecia

with the pyrenium entire, black, minute, above somewhat convexly prominent; spores 8 næ., brown, ellipsoid, 3 septate, 0,018-23 mm. long, 0,007-0,010 mm. thick, paraphyses moderate; hymeneal gelatine not coloured with iodine. On micaceo-schistose rocks, Connemara, Ireland (Larbalestier). This belongs to the section of *V. thelena*.

In addition to the above, other two new *varieties* are also described by Nylander, *l.c.*, pp. 577-8, viz.:—

**Lecanora erysibe**, *var. sincerior*. *Nyl.*—Thallus pale greyish or subochraceo-whitish, subgranulated, areolato-rimose, apothecia pale-brownish, lecanorine. On maritime rocks, Guernsey, and Lough Inagh, Galway (Larbalestier): formerly gathered in the E. Pyrenees (Nylander).

**Lecidea scabra**, *Tayl. f. meiococca*. *Nyl.*—Apothecia reddish or somewhat pale. On maritime rocks, Bay of Nigg, Kincardineshire (Crombie); Letter, Galway (Larbalestier). This appeared in my *Enum.* p. 77 s.n. *L. (parasema) latypea f. coccodes*.

## NOTE ON THE BRITISH SPECIES OF PTERYGIUM.

*By the* REV. J. M. CROMBIE, F.L.S.

In my Revision of the British *Collemaei*,\* in "Journ. Bot." iii., p. 331 *et seq.*, I stated in the introductory observations that probably some species of *Pterygium* would yet be detected amongst the Scottish Grampians. At that time I was not aware that the specimen recorded in "Grevillea" i., p. 171, s.n. *Pannaria triseptata*, *Nyl.*, from Craig Tulloch, Blair Athole, was in reality referable to the present genus. In Stizenberger's "Lich. Hyperb.," however, p. 25 (note), it is, on the authority of Nylander, to be regarded merely as a synonym of *Pterygium pannariellum* (= *Lecothecium rosulans*, Th. Fr.) Another and a new species, not yet described, was detected by me in the North of Argyleshire, in August, 1876, so that the British species of *Pterygium* now stand as follows:—

**1. *Pt. pannariellum*.** *Nyl.*—On limestone rocks, Craig Tulloch, Blair Athole, Perthshire; very rare, and only a single small specimen found in fruit.

**2. *Pt. Lismorensense*.** *Cromb.* sp. n. — Thallus nigricans, subfuraceus, tenuiter vel obsolete radiosus, varie confluens; apothecia

\* These, in various important respects, again stand much in need of revision, if I may use the term; e.g. *Collema lichinodeum* is now referred by Nylander to a distinct genus, *Schizoma* *Nyl.*

nigra, lecideina, parva, marginata; sporæ 8 næ., oviformes, 1-septatæ, 0,010-11 mm.  $\times$  0,005-6 mm., hypothecium violascenti-nigricans. Iodo gelatina hymenialis cœrulescens.

On calcareous maritime rocks in the Island of Lismore, Argyl-shire. From *Pt. asperellum* (Ach.), Nyl., its nearest ally, it differs in the character of the thallus and the smaller spores.

## CALIFORNIAN FUNGI.

By the REV. J. E. VIZE.

The following fungi have been received from Dr. Harkness, with a view to their determination:—

**Septoria** sp.—On *Darlingtonia Californica*. No. 179.

**Macroplodia Arctostaphyli.** Vize.

Epiphylla, sparsa; peritheciis emergentibus, globosis, atris; sporis arcte ellipticis, brunneis.

On leaves of *Arctostaphylus glaucus*. No. 241.

Punctiform, scattered over the leaves; spores narrowly elliptical, coloured,  $\cdot 008\text{--}\cdot 012 \times \cdot 005$  mm.

**Melasmia arbuticola.** Vize.

Gregaria, atrobrunnea, orbiculare, rugosa, e maculis rufo-brunneis oriunda; sporis minutis, hyalinis, rectis, spermatoideis.

On leaves of *Arbutus*. Harkness. No. 209.

Orbicular, clustered on reddish-brown spots, rugose; spores very minute,  $\cdot 0035$  mm. long, straight, linear.

**Pestalozzia Planimi.** Vize.

Pustulis atris, emergentibus, epidermide radiato-fissurato; sporis fusiformibus, 3-4 septatis, quadri-cristatis, atro brunneis; pedicellis longe attenuatis, hyalinis.

On dead stems of *Planinus*. No. 239.

Splitting the cuticle in a radiating manner into about three lobes; spores 3-4 septate, dark brown, with 4 hyaline crests and a long hyaline pedicel; spores  $\cdot 05\text{--}\cdot 06 \times \cdot 01$  mm.; crests  $\cdot 045\text{--}\cdot 055$  mm. long.

**Phragmidium mucronatum.** Lk.—On *Rosa blanda*. No. 194.  
On wild rose. No. 195.

**Puccinia coronata.** Corda.—On oats. No. 182.

**Puccinia Enotheræ.** Vize.

Macula nulla; soris rotundatis, nec confluentibus; sporis brunneis, oblongis, constrictis, pedicellatis.

On *Enothera densiflora*. No. 251.

Accompanied by its Uredo-form; sori round, not confluent; epidermis soon evanescent; spores brown, oblong, with pedicels of the same length.

**Uromyces oblonga.** *Vize.*

Macula nulla; soris oblongis, hypophyllis; sporis subglobosis, fuscis, breviter pedicellatis.

On leaves and stem of Burr cloves. No. 302.

Spores  $.015-.02 \times .02-.025$  mm.

**Trichobasis Betæ.** *Ler.*—On Beet. No. 173.

**Trichobasis rubigo-vera.** *Lev.*—On oats, No. 176. On wheat, No. 223. On grass, No. 181.

**Trichobasis Epilobii.** *D. C.*—On *Epilobium glandulosum*. No. 178.

**Ustilago Carbo.** *Tul.*—On oats. No. 187.

**Ustilago Gynexii.** *Vize.*

Epicaulina; soris linearibus, demum confluentibus; sporis atris, globosis, subglobosis, pulverulentibus, lævis.

On Pampas grass. No. 227.

Spores  $.01$  mm. diam.

**Coleosporium miniatum.** *Lev.*—On *Rosa blanda*. No. 193.

**Peridermium Pini.** *Fr.*—On *Pinis insignis*. No. 188.

**Cladosporium fumago.** *Lk.*—On *Eucalyptus*. No. 218.

**Antennaria Guava.** *Cooke.*

Effusa, epiphylla; floccis moniliformibus, ramosis; ad apicem attenuatis; sporangiis lageniformibus; mycelio tenuissimo.

On leaves of Guava. Harkness. No. 189.

The moniliform threads are very robust at the base, attenuated upwards, much divided, springing from a delicate septate mycelium; sporangia lageniform, mixed with other oval conceptacles, as in *A. Robinsonii*, Mont., which it much resembles. This genus is still very imperfectly understood.

**Capnodium Citri.** *B. & Desm. in Journ. Hort. Soc.*—On orange leaves. Harkness. No. 190.

The perithecia are very long and fusiform,  $\frac{1}{3}$  of a millimetre or more; sporidia oval, very small,  $.007$  mm.

**Erysiphe graminis.** *D. C.*—On oats, No. 174. On wild rye, No. 183.

**Microsphaeria fulvofulcra.** *Cooke.*

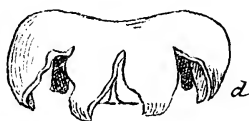
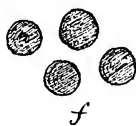
Mycelio arachnoideo; conceptaculis minutis, globosis, gregariis; appendiculis 8-12, ad basim brunneis, ad apicem hyalinis, compactis, 2-3 dichotomis.

On leaves of *Spiræa*. No. 204.

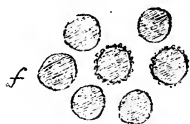
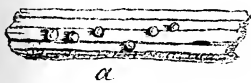
Fulcra brown, colourless at the tips, twice as long as the diameter of the conceptacles, 8 to 12; tips compact, 2-3 times dichotomous, resembling those of *M. Friesii*; sporidia oval; asci not seen.

**Hysterium pinastri.** *Schrad.*—On dead pine leaves. No. 246.

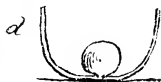
**Hysterium arundinaceum.** *Schrad.*—On grass. No. 247.



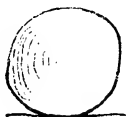
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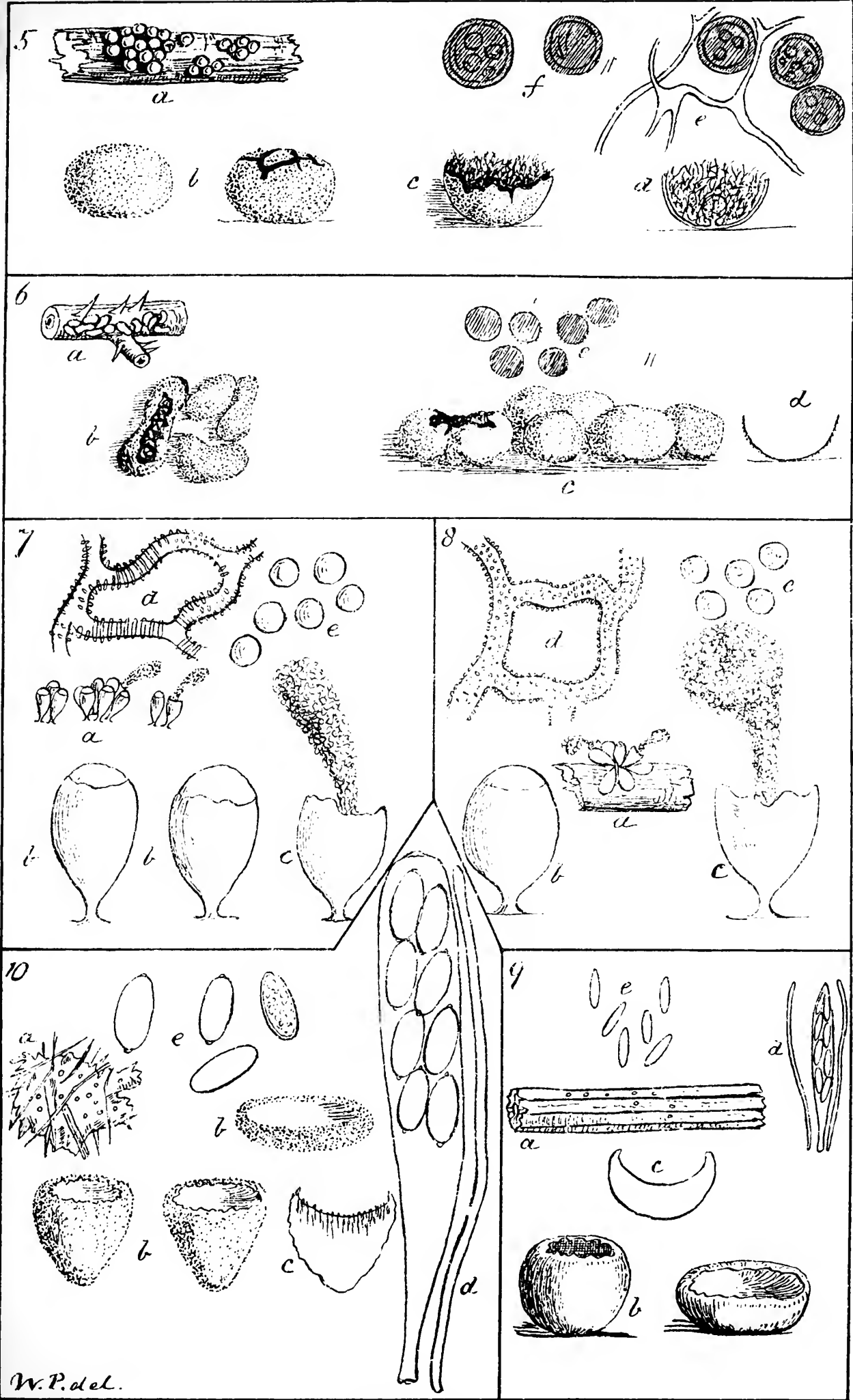


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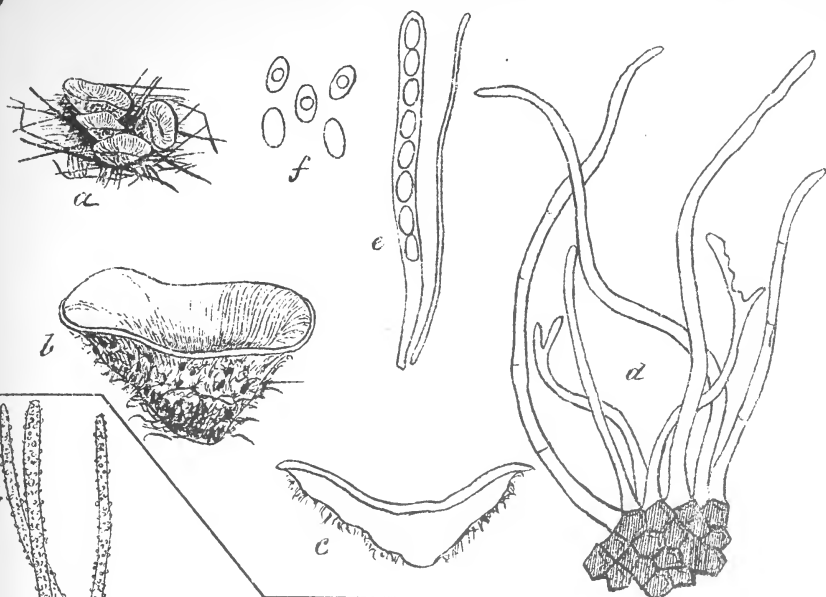


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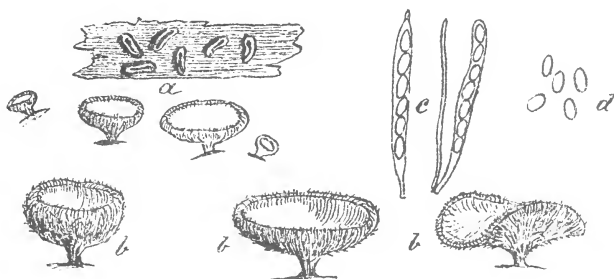




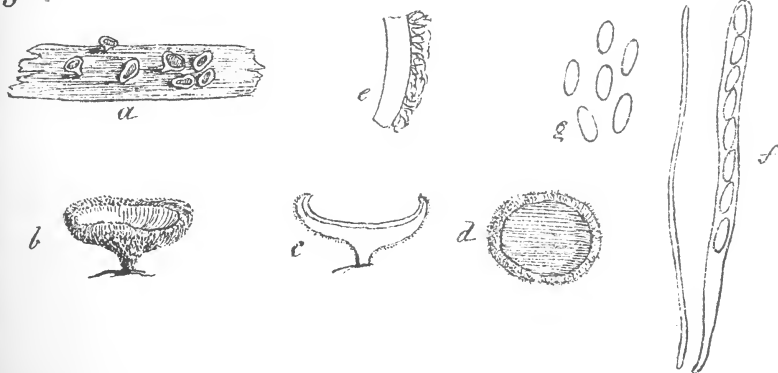
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**Sphæria (Pleospora) permunda.** *Cooke.*

Sparsa; peritheciis globosis, tectis, demum detectis; ascis clavatis; sporidiis ellipticis, triseptatis, brunneis.

On stems of soap plant. No. 244.

The sporidia are quite distinct and characteristic, clear brown, triseptate, one or rarely both central cells longitudinally divided,  $.03 \times .015$  mm.

Nos. 172, 177, 198, 199, 203, 206, 211, 219, 220, 229, and 298 are not satisfactorily developed.

Nos. 222, 226, 245, 250, 300, 301, and 303 are not fungi.

Nos. 197, 225 are insect work.

Nos. 232, 248 are leaf stains.

No. 243 is an *Erineum*.

No. 212 is probably an incipient *Collema*.

## SPECIMENS OF SCANDINAVIAN ALGÆ.

We, the undersigned, have the intention of publishing, under the title of "*Algæ aquæ dulcis exiccatae, præcipue scandinavicae, adjectis algis marinis chlorophyllaceis et phycochromaceis*," a series of prepared algæ. This work, which will embrace partly freshwater algæ (in the first place Scandinavian) and partly marine algæ, to wit of those groups which have also numerous representatives in fresh water, will be published in fasciculi in imperial 8vo, each containing 50 numbers. It is our plan to furnish specimens which are (1) critically determined, (2) properly and well conserved, and (3) free, as far as possible, from foreign admixtures, and in a sufficient quantity. Of *Coleochaetæ*, *Oedogoniæ*, *Mesocarpææ*, *Zygnemææ*, etc., only fertile specimens are given. Complete diagnoses in Latin are always joined to the new species. Two fasciculi are now published. Of the 50 numbers contained in each, several consist of two specimens (from different localities), so that each fasciculus embraces about 60 specimens. The countries represented in these two fasciculi are, besides Scandinavia, Nowaja Semlja, England, Germany, Austria, and Italy. Six new species and three new varieties are given. Several species have never before been given in any collection of exiccata. (Compare the two indices joined.) The price of each fasciculus is 17 shillings (15 kronor Swedish coin, 17 reichsmark, 21.25 francs), expense of freight not being included. Orders accompanied by the above-mentioned sum may be sent to either of the two undersigned.

DR. VEIT WITTRÖCK,

Upsala (Sweden).

OTTO NORDSTEDT,

Lund (Sweden).

Upsala, Jan. 20th, 1877.

## MICROSCOPICAL PREPARATIONS.

For many years the want has been widely felt of some one with a practical knowledge of fungi, and withal expert in their manipulation, who could prepare for those who were unable to do it for themselves, Mycological slides. We have often been applied to during the past to indicate such a person, if he could be found, and the application has been fruitless. This, however, is no longer the case, for we have had the opportunity of examining some of the microscopical preparations of fungi which have been produced by the Rev. J. E. Vize, of Forden Vicarage, Welshpool, and do not hesitate to recommend them to any of our readers who may be in search of such aids to study. It may be observed that no small advantage results from the manipulator being himself a mycologist, consequently the preparations are scientifically and accurately named, to say nothing of the neat and business-like manner in which the mechanical work of manipulation is performed. Here, then, is an excellent opportunity for any one to possess themselves of illustrations of the principal genera of microscopical fungi, any such a series being manufactured to order. We are also further informed that any one who is desirous of doing so may have their own material mounted, so that nothing more remains to be desired, except it be a reasonable and economical scale of charges, which, in this instance also, will be found entirely to their satisfaction. We can only hope that such invaluable aids to the study of fungi will not be neglected, and that Mr. Vize's unique and artistic preparations will find a place in every Microscopical Cabinet, whether specially devoted to Mycological subjects or not.

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## EXOTIC FUNGI IN SCOTLAND.

We have received from Mr. R. H. Paterson the following exotic fungi, which have appeared in the Botanic Gardens at Glasgow :—

**Schizophyllum commune.** *Fr.*

**Polyporus sanguineus.** *Fr.*

**Polyporus pergamenus.** *Fr.*

**Stereum lobatum.** *Kze.*

Of course, no one would expect them to become "distinguished foreigners permanently resident in this country," but only accidental visitors, *Schizophyllum* only being excepted.

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# FUNGI OF CALIFORNIA AND THE SIERRA NEVADA MOUNTAINS.

(Collected by H. W. HARKNESS, M.D., and J. P. MOOR, Esq.)

By WILLIAM PHILLIPS, F.L.S.

The following fungi were collected in the winter and spring of 1876, by Dr. Harkness and Mr. J. P. Moor, and may be considered as supplemental of those enumerated by me at page 35 of this Vol., and those more recently enumerated at page 74, by my friend Mr. Plowright. Of the larger Discomycetes collected on the Sierra Nevada Mountains, at an elevation of 4,693 feet above the sea, in the month of April, at a place named Blue Canon, on the line of the Central Pacific Railway, several are imperfectly developed, having no sporidia; this may be accounted for by the fact that, although spring species, they were collected in close proximity to the snow, which had not at the time disappeared.

I am indebted to the Rev. M. J. Berkeley for his critical remarks on the new species of *Myxogastres*, drawings and specimens of which I submitted to him.

**Exidia recisa.** *Fr.*—Blue Canon, Sierra Nevada Mountains. Nos. 370, 371, 407, 411.

**Dacrymyces stillatus.** *Nees.*—Blue Canon, Sierra Nevada Mountains. No. 377.

**Dacrymyces chrysocomus.** *Tul.*—Blue Canon, Sierra Nevada Mountains. Nos. 354, 438.

**Ditiola radicata.** *Fr.*—Blue Canon, Sierra Nevada Mountains. No. 376.

**Cyphella villosa.** (*Pers.*).—No. 159.

**Diderma geasterodes.** *n. s.*—Pallid rufescent, scattered, stipitate, sphaerical, splitting into unequal reflexed laciniae; inner peridium obsolete, stem darker; columella none; flocci fuscous; spores purplish-black, smooth.

Sp. .015 mm. Resembling *D. floriforme*, but without a columella.

On bark and moss. April. Blue Canon, Pacific Railway, U.S. Dr. Harkness. No. 415. Plate 87, fig. 1, *a*, natural size; *b*, a single plant, magnified; *c* and *d*, in more advanced states; *e*, threads of capillitium; *f*, spores. Threads and spores magnified to the same scale.

**Diderma laciniatum.** *n. s.*—Subsessile, scattered, sphaerical, rufous-brown; peridium splitting into unequal upright laciniae; inner peridium obsolete; flocci and spores purplish-brown. Sp. .013 mm.

On dead wood. Winter. San Francisco. Dr. Harkness. No. 93.

Plate 87, fig. 2, *a*, natural size; *b*, *c*, *d*, magnified, and in different

stages of development; *e*, threads of capillitium; *f*, spores. Threads and spores to the same scale.

***Diderma vernicosum*.** *P.*—Winter. San Francisco, U.S. No. 16.

***Diderma granulatum*.** *Fr.*—Winter. San Francisco, U.S. No. 36.

***Diderma testaceum*.** *Schrad.*—Winter. San Francisco, U.S. No. 82. This specimen differs from the normal form in not being "appanato-sessile," but sessile or substipitate.

***Diderma albescens*.** *n. s.*—Sessile, spherical, contiguous or scattered; peridium brittle, splitting irregularly, whitish; inner peridium obsolete; columella white; flocci abundant, purple-black, as well as the spores.

Spo. .008 mm. "Agreeing with *D. depressum*, in its unusually copious capillitium, but not in other points." M. J. B.

Pine bark. April. Blue Canon, Pacific Railway, U.S. Nos. 361 and 396.

Pl. 87, fig. 3, *a*, natural size; *b*, *c*, magnified; *d*, showing the columella; *e*, *f*, threads and spores magnified to the same scale.

***Diderma brunneolum*.** *n. s.*—Globose, sessile, scattered, rufous-brown; outer peridium thick, fragile, splitting irregularly; inner peridium white, evanescent; columella none; flocci white; spores fuliginous.

Spo. .012 mm. On oak bark. "A very pretty distinct species." M. J. B. San Francisco. Winter. No. 126.

Pl. 87, fig. 4, *a*, natural size; *b*, *c*, *d*, different stages, magnified; *e*, fragment of thread; *f*, spore magnified to same scale.

***Didymium cinereum*.** *Fr.*—Winter. San Francisco. Nos. 7 and 37.

***Didymium squamulosum*.** *A. & S.*—On *Arbor vitæ*. Winter. San Francisco. No. 58.

***Didymium granuliferum*.** *n. s.*—Appanato-sessile, contiguous, subglobose; clothed with dirty cinerous granules; columella small; flocci abundant, black, as are the very large spores.

Spo. .022-.025 mm. On herbaceous stems. Blue Canon, Pacific Railway, U.S. No. 423.

Pl. 88, fig. 1, *a*, natural size; *b*, *c*, in different stages, magnified; *d*, section showing columella; *e*, *f*, threads of capillitium and spores more highly magnified.

***Didymium glaucum*.** *n. s.*—Appanato-sessile, contiguous, globoso-depressed, or elongated, glauco-cinerious, scaly; columella none; flocci white; spores minutely asperate, brownish-black. Spo. .01 mm.

Pl. 88, fig. 6, *a*, natural size; *b*, *c*, magnified; *d*, section of peridium; *e*, spores more highly magnified.

On dead sticks. San Francisco. No. 12.

***Physarum nutans* P. var. *aureum*.**—San Francisco. No. 99.

**Badhamia inaurata.** *Curr.*—Blue Canon, Pacific Railway, U.S. No. 357.

**Stemonitis typhoides.** (*Bull.*)—Blue Canon. Pacific Railway, U.S. No. 422.

**Stemonitis globosa.** *Schum.*—Spo. .01 mm. On oak wood. Blue Canon, Pacific Railway, U.S. Nos. 360 and 424. This last differs in the echinulate larger spores, .015 mm.

**Stemonitis ovata.**  $\beta$ . **St. nigra.** *Fl. Dan.* 2,091, *fig.* 1.—On chips of spruce fir. Blue Canon, Pacific Railway, U.S. No. 375.

**Stemonitis obtusata.** *Fr.*—On pine. Blue Canon. No. 365. No. 359 may also belong to this, but specimen is bad.

**Stemonitis arcyrioides.** *Somm.*—Spo. .009 mm. Blue Canon, Pacific Railway, U.S. On oak bark. No. 397.

**Arcyria punicea.** *P.*—The following numbers pertain to this: 47, 72, 96, 97, 147.

**Arcyria vitellina.** *n. s.*—Crowded, large, shortly stipitate, ovate, yellow; capillitium bright yellow, elongato-clavate, nodding; threads tuberculate and ringed at intervals, spores same colour. Spo. .01 mm.

The peridium splits circularly, a little below the summit, leaving two-thirds of the base as a subpersistent cup.

On oak logs. Blue Canon, C. Pacific Railway, U.S. Nos. 358, 380, 399.

Pl. 88, *fig.* 7, *a*, natural size; *b*, *c*, in different stages, magnified; *d*, *e*, threads and spores more highly magnified.

**Arcyria umbrina.** *Schum.*—No. 5, a bad specimen.

**Arcyria versicolor.** *n. s.*—Crowded, large, shortly stipitate, ovate, pale-brown; capillitium with an elongated flesh-coloured base, and dirty pale-greenish globose head, nodding; threads tuberculate; spores pale-brown. Spo. .01 mm.

"A distinct species, allied to *P. umbrina*; the habit is, however, very different, and so is the 'clayculus,' in which it agrees with No. 380." *M. J. B.*

On pine bark, &c. Blue Canon, C. Pacific Railway, U.S. Nos. 362, 379, 440.

Pl. 88, *fig.* 8, *a*, natural size; *b*, *c*, in different stages, magnified; *d*, *e*, threads and spores more highly magnified.

**Trichia fallax.** *P.*—San Francisco. No. 95.

**Trichia nigripes.** *P.*—San Francisco. No. 97.

**Trichia turbinata.** *With.*—San Francisco. No. 81.

**Trichia chrysosperma.** *D. C.*—San Francisco. No. 18.

**Crucibulum vulgare.** *Tul.*—Blue Canon. No. 441.

**Sphærobolus stellatus.** *Tode.*—San Francisco. No. 6.

The following numbers belonging to the order *Myxogastres*, are not determinable either from being immature or injured in car-

riage:—19, 35, 71, 80, 85, 117, 157, 364, 366, 367, 378, 398, 417, 432.

**Leptostroma.** sp. ?—On acorns. No. 347.

**Dinemasporium graminum.** *Lev.*—On stems of wild oats. San Francisco. No. 161.

**Volutella setosa.** *Berk.*—On herbaceous stem. San Francisco, No. 60.

**Polyactis cana.** *Berk.*—Blue Canon. No. 136.

**Acrostalagmus cinnabarinus.** *Cord.*—San Francisco. No. 28.

**Endogone pisiformis.** *Link.*—Blue Canon, C. Pacific Railway, U.S. No. 344.

**Eurotium herbariorum.** *Lk.*—San Francisco. Nos. 22, 63.

**Gyromitra esculenta.** *Fr.*—Blue Canon, Sierra Nevada Mountains. Nos. 406, 415, 442.

**Peziza venosa.** *P.*—Blue Canon, Sierra Nevada Mountains. Nos. 369, 403, 404, 409, 410. Nearly all immature, sporidia not formed.

**Peziza badia.** *P.*—Blue Canon, Sierra Nevada Mountains. No. 436.

**Peziza vesiculosa.** *Bull.*—Blue Canon. No. 429.

**Peziza leiocarpa.** *Curr.*—Blue Canon. No. 385.

**Peziza granulata.** *Bull.*—On cow dung. Blue Canon. No. 428.

**Peziza (Sarcoscyphæ) maculosa.** n. s.—Sessile, or semi-immersed, fleshy, brown, disc concave; externally marked with dark spots, and clothed with flexuous brown hairs; flesh pallid, firm; asci cylindrical; sporidia 8, ellipsoid, smooth; paraphyses filiform, septate; sporidia  $.014 \times .007$  mm.; cups 1 cm. across; hairs of cup are covered with minute asperities.

On cow dung. Blue Canon, Sierra Nevada Mountains. No. 414.

Pl. 89, fig. 11, *a*, natural size; *b*, a cup magnified; *c*, a section magnified; *d*, hairs of cup arising from the brown cells that form the spots; *e*, *f*, ascus, paraphysis and sporidia; *d*, *e*, and *f*, more highly magnified.

**Peziza (Sarcoscyphæ) stercorea.** *Pers.*—Blue Canon. No. 427.

**Peziza (Sarcoscyphæ) scutellata.** *L.*—On pine wood. Blue Canon, Sierra Nevada Mountains. No. 412.

**Peziza (Sarcoscyphæ) coprinaria.** *Cooke.*—On cow dung. Blue Canon. No. 439.

**Peziza (Dasyscyphæ) succina.** n. s.—Stipitate, scattered or crowded; globose, then expanded, concave, firm; externally coated with amber-coloured flocci; stem short, rufous-brown; disc flesh-coloured; asci cylindrical; sporidia 8, ovate; paraphyses linear, septate.

Sporidia  $.01-.014 \times .003-.005$ . Cups 5 mm. across. On dead oak branches.



Blue Canon, Sierra Nevada Mountains. Nos. 355, 391, 393, 394.

Pl. 89, fig. 12, *a*, natural size; *b*, *b*, *b*, slightly magnified; *c*, *d*, asci, paraphysis, and sporidia more highly magnified.

**Peziza (*Dasyscyphæ*) *arida*.** n. s.—Stipitate, scattered, globose, then expanded, firm; exterior densely coated with brown, septate, tuberculate hairs; stem short, rather slender, brown; asci cylindrical; sporidia 8, ovate; paraphysis filiform.

Sporidia  $\cdot 007 \times \cdot 004$  mm. Cups 8 mm. across, when dry resembling an *Hysterium*.

On pine bark. Blue Canon, Sierra Nevada Mountains. Nos. 352, 353, 392.

Pl. 89, fig. 13, *a*, natural size; *b*, magnified; *c*, section; *d*, seen from above; *e*, fragment of exterior of cup; *f*, *g*, ascus, paraphysis and sporidia more highly magnified.

**Peziza (*Dasyscyphæ*) *nivea*.** *Fr.*—On oak chips. Blue Canon. No. 373.

**Peziza (*Dasyscyphæ*) *virginea*.** *Ratsch.*—No. 156.

**Peziza (*Dasyscyphæ*) *bicolor*.** *Bull.*—On wild raspberry. No. 387.

**Peziza (*Dasyscyphæ*) *hyalina*.** *Pers.*—On spruce chips. Blue Canon. No. 374, 426.

**Peziza (*Dasyscyphæ*) *uncinata*.** n. s.—Minute, stipitate, scattered, clothed with short cinerious hairs, which are recurved at the summit; disc bluish-grey; asci cylindrical or subclavate; sporidia fusiform, straight, or slightly curved; paraphyses linear, occasionally branched. Asci  $\cdot 03$  mm. long,  $\cdot 004$  mm. broad. Sporidia  $\cdot 006 + \cdot 001$  mm.

On pine needles and oak wood. Blue Canon, Sierra Nevada Mountains. No. 351, 382.

**Peziza (*Hymenoscyphæ*) *strobilina*.** *Fr.*—On fir cones. Blue Canon. No. 389.

**Peziza (*Mollisia*) *cinerea*.** *Batsch.*—On dead sticks. Blue Canon. No. 413.

**Peziza (*Mollisia*) *leucostigma*.** *Fr.*—On oak. Blue Canon. No. 421.

**Peziza (*Mollisia*) *phymatodes*.** n. s.—Sessile, scattered, spherical, reddish flesh-colour, glabrous, faintly striate, margin thin, serrated, paler; asci sub-clavate; sporidia 8, oblongo-fusiform, simple; paraphyses filiform. Spo.  $\cdot 013\text{--}\cdot 016 + \cdot 003\text{--}\cdot 004$  mm.

On reeds. Blue Canon, Sierra Nevada Mountains. No. 437.

Pl. 88, fig. 9, *a*, natural size; *b*, cups magnified; *c*, section; *d*, *e*, ascus, paraphyses, and sporidia more highly magnified.

**Ascobolus *carneus*.** *Pers.*—On decaying pine wood. Blue Canon. No. 430.

**Ascobolus (*Ascophanus*) *incanus*.** n. s.—Scattered, turbinate, then plane, with depressed disc, hoary-grey; membranaceous margin

disappearing; asci broadly clavate; sporidia 8, colourless, ovate; paraphyses linear.

Sporidia  $\cdot 029 + \cdot 014$  mm.; in some cases with a papilla at each extremity. The operculum of the ascus is conspicuous.

On cow dung. Blue Canon, Sierra Nevada Mountains. No. 419.

Pl. 88, fig. 10, *a*, natural size; *b*, *b*, cups more highly magnified; *d*, *e*, ascus, paraphysis, and sporidia more highly magnified.

**Sphæria bombardioides.** (*Avd.*)—No. 431.

**Trichoderma viride.**—Nos. 25, 28.

**Hypoxylon coccineum.**—Conidial stage. No. 138.

The following numbers are indeterminable:—446, 384, barren thallus of a lichen, 402, 435, 51, 191, 349, 417.

*Sphæria* species? No. 381.

## NEW BRITISH FUNGI.

By M. C. COOKE, M.A.

(Continued from page 64.)

**Agaricus (Pholiota) Cookei.** *Fries, in Grevillea v. p. 56.*

Pl. 82, fig. 1, figured from the Hereford specimens.

**Agaricus (Collybia) cirrhatus.** *Sch.*

Pl. 82, fig. 3, figured from specimens collected at Shobden.

**Agaricus (Psathyra) biformis.** *B.*

Pl. 78, fig. 2, from drawings by W. Phillips, Esq.

**Hygrophorus olivaceo-albus.** *Fr.*

Pl. 82, fig. 2, from specimens collected by Mr. Terry, determined by W. G. Smith.

**Hygrophorus Houghtoni.** *B. & Br.*

Pl. 78, fig. 1, from drawings by W. Phillips, Esq.

**Cortinarius bolaris.** *Fr.*

Pl. 79, from drawings by Dr. Bull.

**Tilletia bullata.** *Fekl. Sym. Myc. p. 40.*

Epiphyllous. Sori bullate, orbicular, purplish-black; spores globose, purplish-brown; epispore minutely granulated. *Cæoma Bistortarum*, Libert Exs. 88.

On leaves of *Rumex obtusifolius*. Glasgow (R. H. Paterson).

A very interesting and apparently rare species, found by Libert on *Polygonum Bistorta*, and by Fuckel on *Polygonum vivipara*. Spores  $\cdot 015$  mm. diam.

**Sporocybe minima.** *Cooke.*

Atra, effusa; capitulo globoso, stipite erecto, flexuoso, ramoso; ramis divaricatis; sporis minimis, globosis, brunneis.

On damp paper. Notts (W. Jenkinson).

Quite distinct from *Sporocybe alternata* and *Stachybotrys atra*, both of which occur on paper. Spores globose,  $\cdot005\text{--}\cdot006$  mm. diam., pale brown.

**Macrosporium nobile.** *Vize.*

Flocci fasciculate, short, erect, septate, brownish, simple, about as long as the spores; spores large, subpyriform or irregular, multiseptate (4-10), unequally vertically septate (2-6), brown, constricted at the septa.

On dead stems, leaves, &c., of Carnation. Forden (J. E. Vize).

Spores very large,  $\cdot06\text{--}\cdot08 \times \cdot04$  mm.; flocci in tufts. A distinct and characteristic species.

**Peziza (Cupulares) mellea.** *C. & Plow.*

Solitary, hemispherical, then flattened, with a slightly recurved margin; disc honey-coloured, externally darker, ochraceous, granular; asci cylindrical; sporidia elliptical; paraphyses filiform.

On putrid ash. King's Lynn (C. B. Plowright).

Cups about  $\frac{1}{3}$  of an inch broad; sporidia  $\cdot02 \times \cdot011$  mm.

**Ascobolus (Ascophanus) lacteus.** *C. & Ph.*

Scattered, milk white; disc flattened; asci narrowly clavate; sporidia mostly biseriata, elliptical, hyaline; paraphyses filiform.

On cow dung. Shrewsbury.

Cups  $1\text{--}1\frac{1}{2}$  mm. broad; sporidia  $\cdot01 \times \cdot005$  mm. In external appearance it certainly resembles an *Helotium*, but here the resemblance ceases. In size as well as sporidia it differs from the pale forms of *Asc. ochraceus*.

**Sphæria (Immersæ) surrecta.** *C.*

Sparsa. Peritheciis immersis; ostiolis in tuberculo erumpente; ascis cylindræis; sporidiis uniseriatis, elongato-ellipticis, triseptatis, torulosis, brunneis.

On pine railings. Shere, 1864.

Sporidia  $\cdot025 \times \cdot008$  mm., brown, triseptate, torulose.

**Sphæria refracta.** *Cooke.*

Perithecia scattered, covered by the discoloured cuticle, somewhat flattened; asci cylindrical; sporidia uniseriate, obtusely biconical, uniseptate, each cell with one or two nuclei.

On *Scirpus*. N. Wootton.

Perithecia small, scattered; sporidia hyaline, highly refractive, uniseptate, each obtusely conical cell, with one or two nuclei,  $\cdot035 \times \cdot015$  mm.

**Sphæria Michotii.** *Westendorp.*

Perithecia spherical, black, immersed, scattered, slightly elevated; ostiola papillate, piercing the cuticle; asci clavate; sporidia biseriata, biseptate, cylindrical, tritorulose, brown.—*Awd in Gonn. & Rabh. Myc. Eur. t. vi, fig. 75.*

On *Juncus*. N. Wootton.

Sporidia biseptate, tritorulose, brown,  $\cdot018\text{--}\cdot02 \times \cdot005$  mm. It

is the same species as *Sphæria trimera*, Sacc., on *Andropogon*, and *Sphæria biseptata*, Awd., on *Scirpus*.

***Sphæria epicarecta*. Cooke.**

Perithecia scattered, covered by the cuticle, which appears darker over them; asci clavate; sporidia biseriate, broadly lanceolate, 3 septate, yellow, second septum rather largest.

On leaves of *Carex*. Shere.

Scarcely visible when dry. Sporidia  $\cdot 03 \times \cdot 01$  mm.

***Sphæria Marram*. Cooke.**

Perithecia scattered, covered, piercing the cuticle with the short ostium, each in the centre of a minute brown spot; asci lanceolate; sporidia biseriate, fusiform, triseptate, yellow.

On *Ammophila*. Happisburgh.

Sporidia  $\cdot 03\text{--}\cdot 032 \times \cdot 006$  mm. Resembling in some respects *Sph. culmorum*, but asci longer and narrower, and there is a difference in the form of the sporidia, whilst the brown spot about the perithecia is also distinct.

***Sphæria maritima*. C. & Plow.**

Perithecia scattered, prominent, black, seated beneath the cuticle, which at length vanishes above; asci lanceolate; sporidia biseriate, fusiform, 3-5 septate.

On *Juncus maritimus*. N. Wootton (C. B. Plowright).

Sporidia  $\cdot 03\text{--}\cdot 035 \times \cdot 006$  mm.

***Sphæria pontiformis*. Fckl.**

Perithecia covered, disposed in lines, rarely solitary, erumpent, globose, clad with an olive down; ostiola minute, conical; asci elongated; sporidia cylindrical, curved, multiseptate (about 16), the third joint swollen, pale yellow.—*Fckl. Sym. Myc. p. 139*.

On straw. N. Wootton (C. B. P.)

This species was sent us some years since by Rev. M. J. Berkeley, mixed with *Sph. herpotricha*. Some of the specimens published by Plowright in *Sphæriacei* Britt. also contain this species. Sporidia  $\cdot 04\text{--}\cdot 05 \times \cdot 003$  mm.

***Sphæria Nardi*. Fr.**

Scattered. Perithecia subglobose, black, covered, rather prominent; asci cylindrical; sporidia biseriate, fusiform, sometimes curved, 5 septate, yellowish.—*Fckl. Sym. Myc. p. 137, t. vi., fig. 28*.

On *Nardus strictus*. N. Wootton.

Sporidia  $\cdot 025 \times \cdot 005$  mm.

***Sphæria rubelloides*. Plow.**

Perithecia scattered, soon exposed, mostly seated on reddish stains; asci lanceolate; sporidia fusiform, multiseptate (about 9) yellow.

On putrid culms of *Triticum repens*. King's Lynn (C. B. P.)

Sporidia  $\cdot 03 \times \cdot 007$  mm.

***Sphæria Norfolcia*. C.**

Perithecia small, scattered, covered by the cuticle, which is pierced

by the short ostiolum; asci clavate; sporidia biseriate, fusiform, straight or curved, brown, 3-5 septate, constricted at the septa.

On *Juncus* and *Eleocharis*. North Wootton.

Sporidia  $\cdot 045\text{--}\cdot 05 \times \cdot 008$  mm. Accompanied by other perithecia containing hyaline stylospores on *Eleocharis*, which were  $\cdot 04 \times \cdot 0075$  and 5 septate.

***Sphæria clara*. Awd.**

Perithecia scattered, seated beneath the cuticle, which in consequence is darkened above them; asci clavate; sporidia lanceolate, yellowish, 4-5 septate, with one of the cells longitudinally divided.

On *Sparganium*. N. Wootton.

Appears to be the same as specimens distributed by Dr. Winter, under this name, although we have seen no description. Sporidia  $\cdot 035 \times \cdot 01$  mm., the divided cells usually broadest.

***Sphæria (Pleospora) Typhæcola*. C.**

Scattered or gregarious Perithecia covered by the brownish cuticle, which is only pierced by the ostiolum; asci somewhat clavate; sporidia large, triseptate, constricted at the centre, one or two cells divided, brown.—*Macrospora Scirpi*, Plow. *Sph. Britt.*

On *Typha angustifolia*.

The sporidia are quite different from those of *Sphæria Scirpi*, Fr., which is sometimes called *Macrospora Scirpi*. Sporidia  $\cdot 06 \times \cdot 0125$  mm., constricted at the centre, brown, triseptate, with one or two of the cells often divided longitudinally.

***Sphæria (Pleospora) subriparia*. C.**

Perithecia scattered, covered, prominent, globose; asci subcylindrical; sporidia elliptical, large, 7 septate, muriform, amber-coloured.

On leaves of *Carex riparia*. N. Wootton.

Distinct when the leaves are moist, the rather large black perithecia showing through the cuticle; sporidia  $\cdot 05 \times \cdot 015$  mm.; stylospores in similar perithecia, oval, hyaline,  $\cdot 01$  mm. long.

***Sphærella juncina*. Awd.**

Perithecia black, covered, densely scattered, globose, perforated; asci oblong; sporidia crowded, fusiform, obtuse at the ends, curved, 1-3 septate, brownish.—*Awd. in Gonn. & Rabh. pp. 18.*

On *Juncus*. N. Wootton.

Sporidia  $\cdot 03 \times \cdot 005$  mm., at first uniseptate, then triseptate, brown.

***Sphærella Scirpi-lacustris*. Awd.**

Perithecia somewhat membranaceous and fragile, black, covered, scattered, depressed, perforated at the apex; sporidia subfusiform, obtuse at the ends, curved, uniseptate, hyaline.—*Awd. in Gonn. & Rabh. pp. 18, t. v, fig. 73.*

On *Scirpus lacustris*. N. Wootton (C. B. Plowright).

Sporidia  $\cdot 025\text{--}\cdot 03 \times \cdot 005$  mm.

***Sphærella chlouna*. C.**

Perithecia gregarious or scattered, minute, piercing the cuticle

with their broad ostiola; asci clavate; sporidia biseriate, linear lanceolate, uniseptate, hyaline.

On *Phalaris arundinacea* Shere.

Sporidia  $0.18 \times 0.03$  mm. It differs from *Sphærella ignobilis*, Awd., in the size and form of the sporidia.

***Sphærella perpusilla.* Desm.**

Epiphyllous. Perithecia minute, scattered, dark brown, innate, rather prominent, pierced by a pore; asci cylindrical; sporidia ovoid-oblong, hyaline.—*Desm. Ann. des Sci. Nat.* 1846, vi., p. 80.

On leaves of grass. N. Wootton.

Perithecia often covering the entire leaf, very minute, and seldom in good fruit; sporidia  $0.005$  mm. long.

***Pyrenophora trichostoma.* Fr.**

Perithecia innate, conical, black, soon naked above, mouth surrounded by a few short erect hairs; asci saccate, broad; sporidia elliptical, triseptate, yellow, constricted at each septum, with an occasional longitudinal division.—*Fr. Sys. Myc.* ii., 504.

On rotting straw. N. Wootton (C. B. Plowright).

Sporidia  $0.45-0.5 \times 0.15$  mm.

***Asterina Veronica.* Lib. sub *Dothidea.***

The following synonyms of this species are given in correction of the "Handbook:"—

*Dothidea Veronica*, Libert Exs. 175.

*Dimerosporium abjectum*, Fekl. Sym. Myc. p. 89.

*Sphæria abjecta*, Wallr. Fl. Cr. p. 810.

*Asteroma Veronicarum*, Rabh. H. M. ii. 739. Fekl. F. Rhen. No. 461.

*Capnodium sphaericum*, Cooke Hdbk. No. 2808.

On leaves of *Veronica officinalis*. Forbes (Rev. J. Keith).

## ON HETEROSPORIUM.

By M. C. COOKE.

In the course of a communication on the *Dematiei*, read before the Quekett Microscopical Club, on Friday, the 23rd February, some observations were made on the species of *Helminthosporium*, with echinulate spores. It was observed that many years since Klotzsch distributed some specimens of one of these moulds on *Ornithogalum*, under the name of *Heterosporium ornithogali*, Kl. This genus, it was contended, should be maintained for the species allied to this on *Ornithogalum*, of which three or four are known, and amongst these, *Helminthosporium echinulatum*, B. & Br. The genus does not appear to have been described, but may be characterised as follows:—

***Heterosporium.* Klotzsch.**

Flocci erecti, septati, flaccidi. Sporis heterogenis, deciduis, demum multiseptatis, subhyalinis, echinulatis vel granulatis.

This genus approaches *Cladosporium* in habit, rather than *Helminthosporium*, and probably also in the spores being at first concacenate. All the species yet known are parasitic on living or fading leaves.

**Heterosporium ornithogali.** *Klotsch, MSS.*

Epiphyllum, effusum. Floccis flexuosis, nodulosis, robustis. Sporis 1·5 septatis, cylindraceis, extus echinulatis. *Helminthosporium echinulatum*, C., in "Grevillea," iv., pl. 64, fig. 8.

On leaves of *Ornithogalum*, near Shrewsbury (W. Phillips.)

Spores ·03-·08 mm. long.

**Heterosporium echinulatum.** *B. & Br.*

Epiphyllum. Floccis flexuosis, sursum nodosis, fructiferis. Sporis oblongis, utrinque obtusis, triseptatis. *Helminthosporium echinulatum*, Berk., in "Gard. Chron." (1870), p. 382, fig. 63. Cooke, "Handbook," No. 1728. *Helminthosporium exasperatum*, B. & Br. Ann. N.H., No. 1380, t. 7, fig. 4.

On sweet-william and carnation. Flocci knotted above, each knot bearing an oblong spore. Spores ·03-·05 mm. × ·01-·0125 mm. The same species would appear to have been described under two different names.

**Heterosporium variabile.** *Cooke.*

Epiphyllum, in maculis sub-orbicularibus erumpens. Floccis elongatis, fasciculatis, flexuosis, nodosis, tenuibus. Sporis 1-3 septatis, echinulatis. *Helminthosporium variabile*, C., "Fungi Britt.," ii., No. 360.

On leaves of *Spinacia* (Rev. J. E. Vize).

Forming definite, somewhat orbicular, or irregular spots on fading leaves. Flocci more slender than in either of the foregoing, and altogether more delicate. Spores ·02-·05 × ·007-·01 mm.

There appear to be good grounds for regarding these as entitled to rank as distinct species, the similarity between them is that rather of generic than specific value.

Although *Helminthosporium arundinaceum* is by no means a good species of *Helminthosporium*, it cannot be included in this genus. One or two North American species of *Helminthosporium* will probably have to be transferred to this genus, as well as the following:—

**Heterosporium granulatum.** *B. & C.*

Floccis lævibus hic inde furcatis, vinosis. Sporis magnis, oblongis, triseptatis, granulatis. *Helminthosporium granulatum*, B. & C., in "Cuban Fungi," No. 631.

On herbaceous stems. Cuba.

Spores ·045 mm. long. Strongly granulated.

This species differs from the above in not occurring on fading leaves.

The specimens published by Fuckel (No. 108) under the name of *Helminthosporium pellucidum*, Lk., belong to *Macrosporium*. The *Helminthosporium fructigenum*, of Rabenhorst's Fungi Europæi, No. 468, appears to be a *Cladosporium*.

OBSERVATIONS ON THE GENUS *EPHEBE*. NYL.

By THE REV. J. M. CROMBIE, F.L.S.

Having recently been engaged in investigating the synonymy of *Ephebe pubescens* (Linn.), in the writings of the older authors, I was next led to investigate the history of *Ephebe* itself, with the following results, which will be both interesting and useful to Lichenists :—

The name *Ephebe* was first generically used by Fries, who is usually cited as thus employing it in “S. O. V.,” p. 256. On referring, however, to the diagnosis which he gives of the genus, it becomes at once apparent that we owe to him simply a name, and nothing more. He defines the fructification of his genus *Ephebe* in the following terms :—“Apothecia scutelliformia superficialia ; disco excipulo thallode aperto marginato.” From this it is evident either that he had not seen the true apothecia of *Ephebe*, or rather that he had mixed it up with states of *Parmelia lanata*, with which the *Lichen pubescens*, Linn., was frequently confused by the older writers. At all events, he certainly does not define *Ephebe* in the true acceptation of the genus.\*

So, also, Bornet, whose name is usually associated with that of Fries as conjoint author of the genus, inasmuch as he is supposed to have defined it more definitely, is not more accurate in his diagnosis. For if Fries errs with respect to the character of the apothecia, Bornet equally errs with respect to that of the thallus. In his “Commentary,” p. 5, he affirms, “La partie centrale ou médullaire manque dans les très-jeunes rameaux. Dans les rameaux plus âgés, on la trouve composée de cellules incolores, de consistance gélatineuse, irrégulières, très-petites, et mal définies au centre,” &c. Again, in p. 14, he repeats the same in Latin, and says, “Cellulis centralibus gelatinosis, minoribus confusis.” This is quite an erroneous description of the thalline structure of *Ephebe* (vide Nyl., in “Flora,” 1861, p. 132, &c.), whence it follows that Bornet (as in other and more recent instances) must have had something else under the microscope which he describes and figures as *Ephebe*.

The first accurate diagnosis of the genus was given by Nylander, in his “Synopsis,” p. 89, where the true characters of both the thallus and the fructification are described, and also delineated, in so far as relates to *E. pubescens*, in t. ii., pp. 17-20. This diagnosis is virtually transcribed by Dr. Th. Fries, in Lich. Arct., p. 287, who in this case rightly forsakes Bornet, and ceases to trust in the latter’s “subtile disquisitions” (vide Gen. Heterol., p. 2). It thus appears that neither Fries nor Bornet can with any very

\* Fries has, indeed, published the true *Ephebe pubescens* sterile in “Lich. Scand. Exs.,” No. 211, but here, as in other cases, specimens in herbaria must be interpreted in connection with the diagnoses of the authors.



great propriety be regarded as the author of the genus *Ephebe*, but that this rightly belongs to Nylander, who has not only described it according to the characters which it *really* possesses, but has also recently separated from it the genus *Ephebeia*, Nyl., which was formerly mixed up with it, though distinguished by well-marked generic characters.

### ON VALSA VITIS. SCHW.

Having occasion to compare European with American specimens of *Valsa vitis*, I have observed that undoubtedly the two forms are quite distinct. The *Valsa vitis*, Schwz., of which I have a specimen from the late Dr. Curtis, is found, like the European, on the very small vine twigs, from one-eighth of an inch in diameter. But in this the pustules are very much elevated and larger, so as to appear much more prominently, the ostiola are thicker, but what is really of far more importance is, that the ostiola are decidedly sulcate, whereas in the European form they are slender and not at all sulcate. The sporidia are very similar in both. The habit and external appearance of the two are so distinct, that I do not hesitate to affirm that the European form is not the *Valsa vitis* of Schweinitz.

Fuckel, in his "Symbolæ Mycologicæ" (p. 199), gives *Valsa vitis*, Schw., of which he published specimens in "Fungi Rhenani," No. 607. And Professor Saccardo has since, in his "Mycologiæ Veneta," p. 133, pl. xiii., fig. 19-21, repeated the same, as proved by the specimens published by him in "Mycotheca Veneta," No. 186.

Doubtless Fuckel named his specimens from the description, not having seen specimens of the American plant, from which the difference is manifest at a glance.

In order, therefore, to prevent the perpetuation of this error, I have called attention to the points in which the two species so materially differ, and submit the following rectification of the species :—

**Valsa vitis.** Schw. Syn. Car. No. 117.

"Corticem bulbosum reddunt et in pustulam coalescunt." Ostioli latis sulcatis. Berk. & Curt., in "Grevillea" (non Fuckel).

On small vine twigs.

**Valsa vitigera.** Cooke in Herb.

Pustulis minutis erumpentibus, vix bullatis. Ostioli gracilis, paucis, lævis. *Valsa vitis* Fckl., Sym. Myc. p. 199. *Fungi Rhen.*, 607. *Sacc. Mycol. Venetæ*, p. 133, t. xiii., f. 19-21. *Myc. Ven.*, No. 186 (Non Schweinitz.)

On small vine twigs.

Pustules smaller, less elevated, ostiola slender, not sulcate, and not so closely compacted as in the American species.

M. C. COOKE.

## BOTANISCHER JAHRESBERICHT.

We have, on a previous occasion, called attention to this valuable work, of which we have recently received the first portion of the third volume, containing a digest of the Literature of Cryptogamia for the year 1875. Such a work as this must entail a large amount of labour in its production, and we can scarcely think remunerative. It is, nevertheless, of so much value, that we should fail in our duty were we not to urge upon our readers the claims it has for support, and at least to express a hope that Natural History Societies, Field Clubs, and Public Libraries will consider it indispensable. A record of all books, papers, pamphlets, and articles communicated to journals during the year is catalogued, with a summary of their contents. These are classified according to subjects, and also according to countries. In many cases the characters of new species published during the year are also given, and, finally, there is a copious index, in which every species noticed in the volume is placed. It is a work which we do not believe would have been attempted out of Germany, and illustrates favourably the patience and perseverance of our Teuton brethren.

## DANISH FIMICOLOUS FUNGI.\*

Professor Hansen has published in the "Copenhagen Transactions" an enumeration of Fungi of all genera found growing upon dung in Denmark. This is a work of 140 pages octavo, with six excellent plates; although in Danish, there is also a summary in French, which occupies about thirty pages, and gives the essentials of the communication. The chief interest centres in the Ascomycetes, and particularly in such genera as *Ascobolus*, *Sordaria*, and *Sporormia* (if the latter are to be considered genera). Amongst new species we note the following:—

|                                     |                                 |
|-------------------------------------|---------------------------------|
| <i>Ascobolus (Ascophanus) Holm-</i> | <i>Sporormia pulchella</i> , H. |
| <i>skjoldii</i> , H.                | <i>Sordaria barbata</i> , H.    |
| <i>Melanospora fimicola</i> , H.    | <i>Sordaria insignis</i> , H.   |
| <i>Melanospora aculeata</i> , H.    | <i>Sordaria neglecta</i> , H.   |
| <i>Eurotium stercorarium</i> , H.   | <i>Sordaria hirta</i> , H.      |
| <i>Sphærella Schumacheri</i> , H.   | <i>Sordaria similis</i> , H.    |
| <i>Sporormia gigantea</i> , H.      | <i>Sordaria dubia</i> , H.      |
| <i>Sporormia putchra</i> , H.       | <i>Peziza Ripensis</i> , H.     |

Communications of this kind, accompanied by full descriptions and good illustrative figures, are of considerable value; the only objection which can be urged against them is that that they are published in "Transactions," which are practically inaccessible to the majority of workers in other countries. It would be an advantage if authors could make arrangements whereby a limited number of copies could be reprinted separately, and pass into the

\* De Danske Gjedningssvampe (Fungi fimicoli Danici), by Emil. Ch. Hansen, Copenhagen, 1876.

trade. The few persons in each country who are interested in such papers, would object less to paying a good price for a copy, than being unable, as often is the case, to obtain it at all. There is certainly some excuse to be urged on behalf of those who may be so unfortunate as to publish again species which have appeared under such disadvantages, and the first author fails in justice to himself, which a little management might perhaps obviate.

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We regret to announce the death of Mrs. F. Russell, of Kenilworth, on the 11th of November last. Mrs. Russell had long been an ardent student in cryptogamic botany, having taken up first the Confervoid Algæ, and later on the Lichens; but latterly she devoted herself entirely to the Fungi, carefully examining, under the microscope, and drawing them. Being an invalid, she had to be entirely dependent on others for gathering them, but nevertheless she succeeded in making above 800 coloured drawings of the larger fungi, principally of the families Hymenomycetes and Accomyces. Her valuable collection of drawings she has left to the British Museum, forming a great addition to those already there.

C. H. S. P.

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### FUNGI ITALICA.

Professor Saccardo, of Padua, announces the immediate issue of Figures of Fungi, in fasciculi of 40, for four francs, viz., 10 plates of foolscap size, with 4 figures on each plate.

He also announces the issue of a Journal or Commentary, to be entitled "MICHELIA," the price of which is to be one franc per number.

Communications to be addressed to Professor Saccardo, Botanic Gardens, Padua, Italy.

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# Grevillea,

A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY  
AND ITS LITERATURE.

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## THE REPRODUCTION OF THE ASCOMYCETES,

STYLOSPORES, AND SPERMATIA.

By DR. MAX CORNU.\*

### I.—THE SPERMOGONIA AND THE SPERMATIA.

The discovery of the polymorphism of the thecasporous Fungi, Lichens, and Uredines, is certainly one of the most important discoveries of the age in the study of the inferior vegetables, and M. Tulasne is quite entitled to the praise bestowed upon him by M. de Bary, who has called him the *Reformer of Mycetology*. This discovery has, in fact, given a great impetus to the science, and has opened new roads where observers may tumble upon discoveries, and come to conclusions as remarkable as unexpected.

The starting point of the idea of polymorphism is the search for the sexual organs and the fecundation of Fungi. The idea which directed these studies appears to have been that the fecundation ought to take place in the adult plant, as is the case among the phanerogams; this is the cause of the want of success in the work of botanists in the search for the sexual organs of the Ferns. Now, thanks to the observations of different savants—notably MM. de Bary, Woronin, and M. Tulasne also—one knows, among the young Ascomycetes, the organs analogous to the fecundatory organs; and although this question is still not exempt from some amount of obscurity, one can say that these facts are henceforth acquired by science. I can only, further, verify some upon the Fungi as sufficiently different from those which have been hitherto examined.

The ancient sexual theory of the spermatia raised by M. Tulasne has been quashed by him—that is to say, overturned by his ulterior observations upon the *Peziza (Pyronema) confluens* and the *Peziza melanoloma*, but a more complete study will prove that it was really the case.

Notwithstanding this evolution in the appreciation of the sexual

\* Translated from "Annales des Sciences Naturelles," ser. 6, vol. iii., parts 1-3.

functions, the merits of the French botanist remain intact, seeing that this theory, destined to be replaced like all theories, had the immense merit of being impregnated with new ideas, and may be the origin of important discoveries, such as that of the alternate generations (or heterœciæ) of the Uredines, which proceeds immediately from it.

*Spermata; their supposed Fecundative Rôle.*—M. Tulasne, in two memoirs, the starting point of his studies, made known—first among the Lichens, then among the Ascomycetes—a constant reproductory apparatus which he calls *spermogonia*. The spermogone is filled with small specious bodies which he calls *spermata*, which are engendered in great number; the names owe their origin to the idea which the author had of their rôle in the fecundation. This fecundation ought to give place to the production of the spores contained in the thecæ. He explains little, though, of the way in which it operates.

Among the Lichens, the spermogonia, which are not abortive apothecia, but some perfectly autonomous organs, are sometimes brown and very easily seen (*Borrera ciliaris*, where they are especially easy to study), sometimes indistinct, colourless, and even immersed in the thallus (*Opegrapha*); they are situated at very variable places, more often upon the border of the thallus.

They contain, in their interior, a kind of crooked filaments, simple or slightly ramified, composed of short joints, and each of which gives birth, laterally and at its summit, to a spermatium in the form of a straight or curved tipcat; the spermata are at times of a different form, elliptical, or rather very slim and curved in an arc. It is necessary to guard against confounding with them the stylospores, which are, for the rest, rather rare in the family of the Lichens.

A little later M. Tulasne described these same bodies and these same organs in the great group of the thecasporous Fungi. He published a part of his researches in the "Annales des Sciences Naturelles," 3rd series, 1853, t. xx., p. 129; and along with it one finds an admirable work entitled "Selecta Fungorum Carpologia." Here is an exposition of the different modes of reproduction of different vegetables comprised in the group of the *Pyrenomycètes* and of the *Discomycetes*.

In each of them one generally finds:—

- 1st.—The conceptacles containing thecæ, the more often octosporous.
- 2nd.—The pycnidia, containing stylospores.
- 3rd.—The spermogonia, containing some spermata.
- 4th.—The conidia, born at the outside of the whole cavity.

M. Tulasne establishes the specific identity of these different forms by proving that they proceed without parasitism from the same mycelium; for the rest, all these apparatus of reproduction,

when one considers them in a series of allied species, offers a general character, and have a similar disposition; similar comparisons prove, in another way, that these different spermatophorous apparati are exhibited with the same aspect as they have in the Lichens, but with a greater variety, because the group is more extensive. The spermogonia are, in general, more abundant, and thus are to be more easily studied; the elements are more clear and clean, the membranes less diffuent and gelatinous, and the corpuscles produced in greater quantity. The spermatia are thrown off under the form of *cirrhi*, a sort of very slim, small, viscid cylinders, white, yellow, red, or rose-coloured. Placed in water, these *cirrhi* become disentangled immediately; the gum, which unites the spermatia and glues them together, is dissolved, and they are set at liberty; they appear at times to be agitated in the liquid, with a movement of special trepidation very different from that which drags away the diatoms and zoospores, and which is here purely molecular.

Their form is that of straight or curved tipcats; they may be ovoid or spherical (*Melogramma rubricosum*), at other times more elongated, curved in an arch (*Eutypa Archarii*), or in the form of the letter V (*Diatrype quercina*), or yet in the form of a comma, very slim at one extremity, swelling at the other (*Polystigma rubrum*), &c.

The branches which bear them are either arbuscles, like those of the Lichens, the cellules of which are in general more elongated, or short sterigmata.

The spermogonia are either separated or united, presenting an unique or spherical or labyrinthiform cavity; at times the spermatia are borne entirely without conceptacle at the surface of the Fungus (*Stictosphaeria*), like the ordinary conidia.

Notwithstanding the great diversity of form of the spermatia and of the organs containing them, it is impossible for one not to be struck with the extreme analogy which exists between the greater part of these apparati and those which are encountered among the Lichens. We know, besides, at the present time, from the recent works of MM. Schwendener, Rees, and Bornet, that the Lichens are only a special group of the great class of Fungi.\*

The fact common to all the corpuscles called spermatia by M. Tulasne is, firstly, their being extremely small—at least, in one of their dimensions—and being produced in enormous numbers by the organs which give them birth. M. Tulasne, having attempted to make them germinate, has proved a series of checks. To the preceding characters, purely physical, must be added a physiological character, the refusal to enter into germination under ordinary conditions. Corpuscles, so considerable in number, which do not germinate nor engender any mycelium, ought not to be

\* This knowledge is confined to believers in the theory associated with these names.—Ed.

considered as spores at all. In presence of a sporific organ such as the theca, the development of which takes place in particular conceptacles, and the maturity of which is posterior to the maximum of development of the spermogonia, it was natural to combine the two forms together; the theca being probably the female organ; the corpuscles, which do not germinate, according to M. Tulasne, being the male organs, physiologically analogous to grains of pollen. But the reciprocal action of these two sorts of organs, the manner in which they produce the fecundation, and the precise instant at which it takes place, still remains doubtful.

*En résumé*, the spermatia have been considered as some male organs, because of their very much reduced dimensions, of their considerable number, and, above all, the impossibility of making them germinate.

M. Pringsheim also dwelt upon the absence of germination of certain agile bodies developed upon the *Saprolegnia*, considering them as male organs, like the antherozoids.

In a special work upon the fecundation of the *Saprolegnes*, I have shown that this way of looking at it is inexact; the supposed antherozoids of the *Saprolegnia dioica* and of the *Achlya dioica* are not by any means the productions of the plant which bears them, but really some parasites. Among the *Ascomycetes*, in many cases, the same objection cannot be made, and the organs in question belong in reality to the plant on which they are encountered. The foregoing considerations have caused me to look for the cause of the want of success obtained by M. Tulasne, and maintain that the organs of fecundation are more exactly known among the thecasporous Fungi. It is necessary to renounce the idea of the spermatia being male organs; if these are, therefore, spores, they ought to germinate like other spores.

## II.—GERMINATION OF THE SPERMATIA.

The first attempts, with a view of obtaining the germination of the spermatia, did not succeed; they were repeated many times. At the same time as the spermatia, and with more success at first, some stylospores and endothecous spores of different species of *Pyrenomyces* were put in germination. This allowed me to make, a great number of times, two observations, which, without being new, had a great influence upon the final result.

The spores obtained by means of cuts with a razor, and separated with needles, were disposed in a drop of water upon a microscopic slide; they remained open to the air, or were, according to the case, covered with a very thin plate of glass. The preparation was left in a humid atmosphere in order to invite dessication; one could then see that the spores required, in order to germinate, the influence of fresh air. In a preparation covered with a thin glass, the germinations only exhibited themselves at a very short distance at first, becoming less and less



active, in a measure, as one removed further away. At the centre and then at a certain distance from the borders, none of the spores presented any development. This absence of development ought not to be attributed to anything else than the want of air; the germ filaments, as well as the spores, have need of oxygen in order to increase.

Numerous examples show, besides, that the spores at times augment in a very considerable manner; that they can then change in form, so as to be quite unrecognisable again.

After many fruitless attempts, I think I saw that certain spermatia were considerably modified in their form and size; they were all situated upon the same side of the preparation, in an angle, right at the side of the gummed label, upon which was written the name of the species experimented upon, and the date of the sowing. The excess of water had dissolved some little of the gum, the presence of which having determined this considerable modification, which, for many reasons, was not extensive. The idea then struck me of giving the spermatia no more pure water, but a nutritive liquid. The spores of *Mucor* do not germinate freely in pure water whilst a centième of sugar determines their development.

In order to make the spermatia germinate which the more generally accompany the *Diplodia acerina*, the following course may be adopted: a stick of *Acer pseudo-Platanus* was thrust into water, and a filtered drop of the liquid thus obtained received many spermatia; the temperature was from 8 to 10 degrees about. In about five days, in the midst of a very great number of bacteria, one could see well at some points of the preparation many short filaments, thick, misshapen, and of a size so different from that of the spermatia that I could scarcely have reported them to be the same species, if I had not been prevented by the observations made upon other spores. The intermediaries were seen; but it is necessary, in order to remove all these doubts, to repeat the experiments under more suitable conditions.

Two things were particularly unfavourable. These were:—

1st.—The want of air in a preparation covered by glass.

2nd.—The presence of numerous bacteria and of various mucedines, introducing themselves by the sides of the preparation; the bacteria were, above all, unfavourable, because of the small dimensions of the spermatia, which one may confound with certain developments due to the bacteria.

We will here explain how it was possible to change, at least partially, these so disadvantageous conditions. One requires some cellules formed of a glass tube, or of lead cut perpendicularly on its axis and round, following two parallel and slightly different planes, and glued by one of these sections upon the slide. These cells are like those which M. Van Tieghem used for his culture of

the *Mucorines*, and which he has figured in the "Annales des Sciences Naturelles," 5th serie, t. xvii., pl. 20, f. 1.

The spores were disposed in a drop of liquid and placed upon the thin glass cover. This last was supported by its edges upon those of the cell, the drop occupying the inferior face. One can then, by the aid of the microscope, explore all the points of the drop of water, the inferior surface of which is in contact with the air. In order to prevent dessication, a big drop of water was placed at the bottom of the cell. In order to fix the cover, one must not use anything oily, which would obstruct the renewal of the air, but, by two small pellets of soft wax, fixed with a flat needle upon the edge of the cell, the air can circulate, and be gradually renewed. The whole was placed in a damp chamber formed of a square tin case, containing a brick dipped in water; the case was covered by a sheet of glass at a little distance from the surface of the brick.

In this narrow space one can preserve moist, without adding water, preparations thus disposed for more than six months; they do not dessicate, even thus long. The spores disposed upon the covers were in contact with the air, renewed in an atmosphere which stopped the dessication of the drop of water.

In order to avoid the introduction of strange spores by the nutritive liquid, and, above all, the development of bacteria, one spots, by making of all fragments, as M. Raulin did in his cultures of *Aspergillus niger*, a liquid, by the aid of chemical substances pure and exempt from germs. The liquid, containing  $\frac{1}{100}$  of sugar, and  $\frac{1}{50}$  of tannin dissolved in distilled water. These two substances are encountered simultaneously in the bark of the wood of the greater part of the phanerogamous plants upon which develop so great an abundance of Ascomycetes. The addition of an acetate matter in the nutritive liquid ( $\frac{1}{100}$  of acetate of ammonia and  $\frac{1}{50}$  of sugar) was tried, but this second liquid did not appear to give such good results as the first.

The different species experimented upon have been chosen at hazard, according as the chances and facilities occurred of easily procuring those which presented spermatia sufficiently clear and easy to determine.

One of the species on which one finds it commonly is the *Diplodia acerina*. The long branches cut during the winter of 1870 and 1871, and preserved in faggots without too much damp, were covered with spermogonia in the following spring, and furnished good materials for study; the dead branches of *Cratægus oxyacantha*, made into brushes, frequently present the *Diplodia vulgaris* and its spermogonia, which are scarcely ever wanting. These two *Diplodia* have given me excellent results.

The spermatia which accompany the *Diplodia acerina* are very narrow and curved in an arc; sown upon a nourishing liquid their form modifies at first, without augmentation of length; they

become oval; the concave part of the arc fills out, and the general form of the spore is completely modified; the plasma, which was very dense and without globule, appeared more clearly characterised. One perceived, upon the principal borders, some granulous traces and some outlines of vacuoles. A little later, after four or five days, the spore emitted one or two short and deformed filaments, the diameter of which differed a little from the transverse diameter of this same spore after its swelling out.

In this state one sees that the germination is very clearly commenced; but the more often, the nourishment is appropriated badly, only sufficing to determine this *début* of development, not allowing it to go further on. There also exists bacteria which have multiplied, and the presence of which in the preparation singularly obstructs the march of experience. Upon many preparations disposed with the same spores and the same liquid, some arrive well, whilst others only give place to some strange productions. This irregularity is not one of the least difficulties that one has to deal with.

In each case a comparative attempt was made in pure water, but never brought forth any results; by the side of the cell in which the sowing was placed in a nourishing liquid, and in which, in identical conditions, a sowing was tried in pure water. Upon all the species studied the comparison was established, so as to show the difference of the developments. The *Diplodia vulgaris*, developed upon the *Cratægus oxyacantha*, gave absolutely analogous results, although the development appeared noticeably more slow; it was the same with that of the lime-tree (*Diplodia*).

The spermatia of *Valsa leucostoma* were gathered upon a branch of peach tree, and they were sown simultaneously in the same nutritive as before, and in pure water. In the water the spores remained without changing during many weeks; in the nutritive liquid, on the contrary, in about two days these spores had completely modified their form: slender, disposed in an arc, they were becoming irregularly oval, and were already noticeably elongated. But after four days they were not recognisable; they had taken the appearance of deformed filaments, upon which one could hardly see, in certain cases, the spore which had given them birth; but they did not continue to elongate, want of nourishment probably.

The *Valsa liphæmia*, common upon the oak, offers spermatia of the same form. Sown under the same conditions, these spermatia increased in size, slowly remaining more or less pointed at one of their extremities. Their bigness was very unequal; at about the seventh day these spores had increased more than ten times in volume; after fourteen days they had still got bigger, some of them presenting appearances of prolongations, but not clear. In *pure water* they had no development, no modification of any sort.

In the *Valsa liphæma* M. Tulasne signalises no spermatia as in the *V. leucostoma*, but some spermatiform stylospores, and names the organ which produces them *Pycnis spermogonica*. He has very exactly represented some of the spermatia very clearly curved in an arc, notwithstanding the others are, perhaps, a little too rectilinear. He has obtained the germination by sowing in water; he has observed also this singular swelling out of the spores, which is, in the figure, relatively feeble, although in this species the spore can attain up to ten times its primitive diameter. I have not been able to obtain any development of the spores in pure water. Has M. Tulasne maintained in the water a transverse cut of the bark which might have some nutritive elements? It is this germinative faculty which has caused the illustrious mycologist to name these spores stylospores, and not spermatia, although they possess many of these last, and thus makes a compromise between the two opinions, and names them spermatiform stylospores. The *Valsa liphæma* is one of the more common species of our neighbourhood.

The general characteristic of this germination in the preceding species is, first, a considerable increase in diameter; it appears that the spermatia behave themselves like the spores which were withered, hardened, and which have want quite at first to resume their normal form. It does not appear, as in many stylospores (*Diplodia*, *Massaria*, *Melanconis*, etc.) that they have a primary external envelope to burst through in order to emit a germ filament; such is, perhaps, the character which distinguishes the stylospores from the spermatia.

After this first swelling out follows the growth of big and deformed filaments; but once the nourishment of the drop is exhausted, the germination stops. The exactness of this view of the matter is clearly evident by the fact that, when these spores are accumulated in too great numbers in the same nourishing liquid, no development takes place, even in the open air.

Some very clear and conclusive results were also obtained with the spermatia of an Ascomycete, very common at Chaville, upon the poplar, the *Valsa nivea*.

The spermogonia offer some labyrinthiform cavities, from which escape an innumerable quantity of very small, very slender spermatia, and they are curved in an arc. Sown in the nutritive liquid, they are not long in swelling entirely, and after two days they have already acquired an oval or irregular form. They become elongated at the end of some days, and imitate the spermatia of the *Diplodia acerina*, but they present a little more considerable growth. The plasma has entirely changed in appearance; it presents some recognisable prolongations, in place of being dense and thick, as it was primitively in the interior of the spermatia. At the end of nine days, whilst there are some veritable germ filaments in the nutritive liquid, the spermatia, placed comparatively in

the pure water, show no development at all. For the rest, they present a change similar to that which has been described and figured by M. Tulasne with the endotheous spores.

Another Ascomycete, which is encountered very abundantly upon the fallen branches of the plane tree, presenting abundant spermogones, but they are always unprovided with ascophorous conceptacles. One also encounters, although more rarely, the clustered brown spores of the *Hendersonia mutabilis*, Berk. et Br. (*Pietospora Desmazieri*, Mont.), which are only the stylospores of the *Massaria Platani*. These spermogonia are grouped under the bark, in the same manner as the ascophorous conceptacles and pycnidia of the *Massaria Platani*. It is this species to which I say they belong. M. Tulasne has not signalled any spermagones in this species.

The spermatia grow upon some clustered elongated filaments; each one of them is borne by a very short and almost invisible sterigmate; the cell which produces a spermatium is elongated laterally at the exterior of the immediately superior cell, and forms a *début* of ramification. This prolongation is swelled out a little, then separated by a partition.

The spermatia are oval, of a longitudinal diameter equal to  $\frac{1}{275} = 0^{\text{mm}} \cdot 0035$ . Their size and their origin leaves no doubt that these may be very truly some spermatia. One can conceive the difficulty of determining the species when they are received in a favourable state, and not in a too advanced state, that is to say when the other reproductive organs (pycnidia and, above all, conceptacles), which alone give an exact determination, are not yet capable of being developed.

Along with the multilocular spores of the *Hendersonia* are encountered sometimes those of the *Diplodia paupercula*, which are bilocular, but they are to be observed much more rarely.

Sown upon the nourishing liquid, these spores, in about five or six days, increase in every sense, and remain pretty nearly like, except in size, those which they were originally; the body of the spore, more or less visible in the midst of the filament, presents one or two prolongations already visibly increased in size. After ten or twelve days the point which corresponds to the spore is partitioned in such a manner as to form some cells of equal length and breadth, and they swell out, as it were, like little barrels, whilst those of the extremity, longer than broad, more narrow than the preceding, remain almost cylindrical. The internal plasma takes a perfectly novel appearance; in the middle of the granulous parts are exhibited some extremely peculiar oleaginous gouts, and of which hitherto there have been no traces. These oleaginous gouts are to be encountered in a certain number of species of Ascomycetes; here they show that the primitive spore is really and positively nourished at the expense of the liquid which surrounds it. At the same time, as the filaments are elon-

gated in a considerable manner up to attaining more than a hundred times their primitive length, the partition takes a perfectly special tint: it is black in colour, just as takes place in the greater part of the Ascomycetes; it exhibits a colouration characteristic of this group of Fungi. Also, in this case the germination is not arrested by any indications of filaments, but it took place with a considerable vigour. The liquid was probably better appropriated by this species than by all others, and I have no doubt that with any bungling no notable increase of the spermatia of any one species would be possibly obtained. It is necessary, in fact, to furnish them with a nourishment similar to that which they find in the bark which allows of their development. It had there in the preparation a veritable grey felting of crossed and interlaced filaments. It does not proceed from strange spores, like that which frequently produces itself in the seed beds of this nature, and one might assert it for two reasons: the first is that the development has gone on day after day; the second is that this development does not show itself upon isolated spermatia, but on the assembly of the spores—that is to say, upon *thousands*, presenting all, *at one and the same time*, the same modification. When any strange spores have introduced themselves into a cell, it is always isolated, although there all the spermatia were in the same state at the time. In pure water it had no development at all; in the water held in suspension by the gum these germinations, unmingled, as I have said above, grow wild easily. A remark easy to make for the rest, and which arises from daily observations, is that when a preparation gives good results at one point it gives also in all its points, because in nature these spores, all issuing from the same spermogone, are in the same conditions; when one germinates, the other ought to germinate also. The examination of one point alone of the preparation suffices; one has no need of searching with care if among the mass some are developed. One might, therefore, easily decide whether such or such a preparation ought to be applied or put on one side.

One ought to specially signalize yet another Ascomycete, with red spermatia, encountered upon the chestnut trees at Chaville, and which ought to be considered as the spermogonial form of the *Stictosphaeria Hoffmanni* (Tul.), the spermatia, curved in an arc, and very slender, presenting in the nutritive liquid, a partial development, but quite peculiar. They grow in the nutritive liquid only, but in place of becoming oval by the swelling out of the whole of the concave part, as was the case in the *Diplodias* and *Valsas* cited above, a portion only of this partition becomes dilated, in such a manner that the spore appears, after two or three days, to be composed of one part oval, surmounted by a rather short arc, often in prolongation of one of the sides of the partition.

Still, all the spores which one would include in the spermatia of

M. Tulasne are not so difficult to get to germinate; they have not always need of a nourishing liquid in order to develop and emit some filaments.

The *Cucurbitaria Laburni* is a beautiful species of Ascomycete, which is frequently found upon the dead branches of the *Cytisus Laburnum* and allied plants. The spermatophore branches isolated in some special conceptacles, are short, massed, and soldered together; their cells are swelled out and globulous, so as to lead one to the belief of their being some very small stylospores. If one compares these short and amassed branches with those of the spermatia with those of the *Dothidea ribesa* (17), one is convinced of the great analogy which exists between them, and one recognises that they are identical.

The polymorphism of the stylospores of this species, sometimes partitioned in many ways and coloured, sometimes without partitions and colourless, with all the intermediaries, has determined M. Tulasne to call them under the same name. He has remarked still that the white *stylospores* occur at times together in a special conceptacle, which he has called *pycnis leucospora*. But these white micro-stylospores are not *tout à fait*, resembling the white stylospores found in the pycnidia, in lieu of being oval, as they have been represented according to the plate of M. Tulasne; they are noticeably different—elongated, rather, slender *curved in arc*, more rarely rectilinear. These are veritable *spermatia* in all their characters. What has really been the cause of their separation is their facile germination, which here takes place, not in a nourishing liquid, where they have refused to develop themselves, but in pure water. Like their congeners, they swell out—it may be in the whole of their length, it may be by one extremity only—and are partitioned in very good time, so as to cause them to resemble some bilocular spores. Some filaments arise from the elongation of their extremity, but in pure water only are they seen to advantage. Many attempts made by me have given the same result: relative success upon water, complete want of success in the nutritive liquid. The brown or white stylospores, in place of being arrested, are remarkable for the facility with which they emit some germ filaments, which grow very rapidly.

Another example of development in pure water, but arrested likewise almost immediately, is furnished by the *Aglaospora profusa* (De Not). This species possesses some very remarkable endothecous spores with four black cells contained in a clear envelope; it is common upon the branches of *Robinia pseud-acacia*. It possesses otherwise some oval stylospores, dew-like, and some long spermatia, slender, curved in an arc, born from a dense tissue, in which the spermatophore arbuscles are not easily visible. These last are often found mixed with the preceding, or rather, are contained in some isolated spermogones.

Placed upon the nutritive liquid, they have not presented any development; upon the pure water, on the contrary, after two days and a half one might see upon the partition one or two prolongations, not terminal, but borne at some one point of the side of the concavity or convexity, as if the spore was disposed to germinate *without augmentation of volume*; but this development does not always take place. In repeating anew the same sowing under the same conditions, I have obtained the same results, equally incomplete. The same fact is presented under similar circumstances with the *Quaternaria Persooni*, the spermatia of which are likewise linear and recurved *en arc*.

Thus in this case, as in the preceding one, the water which has determined the *debut* of the development of these spores has only produced a more considerable elongation; an appropriate nourishment appears necessary. We will show further on that the spermatia of the *Aglaospora profusa* have only to be sown upon a branch to give place to the production of the Ascomycete.

In order to achieve the demonstration that the spermatia are really some spores and not *male* organs more or less analogous to the antherozoids, and in order to demonstrate that they germinate easily in certain cases, it will be sufficient to signalise the species the spermatia of which germinate in water, and the development of which is least difficult to obtain.

Many of these species are indicated in the magnificent work of M. Tulasne, and have been represented by him in this state.

*Dothidea melanops* (Carp., t. 11, p. 73, pl. 10).—The spermatogones, with spermatophore branches represented (*loc. cit.* f. 6), are the analogies of those of the *Dothidea ribesia*, Fr. (*loc. cit.*, pl. 9, fig. 4), upon which we have no doubt. More condensed here and more confused, they bear none the less some identical organs, some spermatia. The presence of stylospores very clearly confirms still more this determination. In the meantime their germination is represented (fig. 7) by M. Tulasne himself. Their increase in size is very notable. M. Tulasne calls them spermatiform microspores.

*Entypa Acharii* (p. 53, pl. 7, fig. 8-20). Here are represented some microtylospores which likewise have germinated. The author also figures the same, born upon some free branches much resembling the spermatophore branches (fig. 10). This identity drew from him the remark that this proves how many are allied to one another, the conidia, and these small spores, considered as spermatia, or stylospores (*loc. cit.* p. 54): "E mira illa similitudine manifeste patet proximam conidia inter et semina exilia pro stylosporis vel spermatiis habita etiam exstare necessitudinem." He names them stylospores, but in the *E. flavovirens* he named the analogous corpuscles (*loc. cit.*, fig. 4, p. 58) spermatiform stylospores, and says nothing at all about their germination.

In the enumeration of the *Valsas* one will likewise find described



some ambiguous reproductive bodies having the appearance of spermatia, but endowed with the germinative faculty; it is this which causes them to take the name of spermatiform stylospores; it is probably for this reason that the author has not believed it to be necessary to reunite to the *Valsa*, the veritable stylospores, which have been described under the special name of *Diplodia*, and which so frequently accompany their spermogones, because it there had two sorts of spores capable of germinating. One can refer to the pages 188 (*V. liphæma*) and 174 (*V. corylina*), and will find the trace of this embarrassing case, which translates itself, p. 170, in the description of the genus, *Valsa*, by these precious words here gathered: "Spermatia (quæ si malucris *microstylosporas* nonnunquam meritissime dicas;)" "*à propos* of the genus *Eutypa*, p. 60: "Spermatia seu stylosporæ;" "*à propos* of the *Dothidea*, p. 65: "Spermatia sive microstylosporæ, etc."

The *Cenangium Ribis*, Fr. (t. iii., pl. 19, fig. 1-9, p. 163) presents, besides the stylospores, some much smaller corpuscles, which are only spermatia, but, as they germinate, M. Tulasne designates them under the name of conidia; these last organs are exhibited with a much more characteristic form than amongst the *C. Ulmi* (Tul.), in company of bigger stylospores. M. Tulasne says *à propos* of this, p. 171: "Spermatia sinceriora mentiuntur bacillos plerisque Lichenum solennes." These spores are really homologous in both cases: they germinate in the first, therefore they ought, probably, to germinate in the second, notwithstanding their characteristic form, I will venture to say *typical*, since it is among the Lichens that the spermatia have first been discovered.

It appears, therefore, to be well established by the preceding that the spermatia ought to germinate, either upon water, as that resorted to already from the figures of M. Tulasne's work, or in an appropriate nutritive liquid. This accords with the facts observed in the study of the development of the ascophorous development of the Ascomycetes; the observations demonstrate that the fecundation takes place at the time of the development of the conceptacle itself, by a conjugation of filaments, and not by the means of antherozoids.

The nutritive liquid employed was chosen, not quite at hazard, but without other previous attempt for the substances introduced, and the proportions, than the triple primitive success, it has succeeded in almost all the cases attempted, the filtre only failing frequently, without this it gives place to the development of bacteria; if the spermatia were too numerous in the preparation, the germination produced was bad. Certain reasons led to the belief that this liquid was not the best possible one, because, at times, it had a dépôt, the nature of which, besides, has not been recognised, but which did owe its production to a precipitation of a part of the sugar by the tannin; it also at times forms like a pellicle, which ought to be attributed to the presence of the tannin. It is possible

that in each case it failed from special proportions of particular organic productions; this point has a right to be left entirely on one side. It is by its substances (sugar, tannin, different essences, alkaloids, salts, etc.) spread in different proportions in the different vegetables that the Fungi would probably choose for their station, at times upon rather different vegetables (*Stictosphaeria Hoffmanni*, *Nectria cinnabarina*, *Eutypa lata*, *Valsa ambiens*, etc.), at others upon one only, and unique vegetable (*Aglaospora profusa*, *Acacia*; *Massaria Platani*, Plane-tree). If still the exact proportions are necessary for the complete development, it ought, probably, not to be otherwise for the *début* of the development.

The essays attempted upon the Lichens (*Borreria ciliaris* and *Parmelia Acetabulum*) gave no result, there is here, in fact, a greater difficulty to deal with. The spermogones of the Ascomycetes become decomposed when they have terminated their vegetation, when their spores are not in a good state, and that they are done for, as one would vulgarly say; in Latin one designates them under the name of *spermogonia obsoleta*. The whole of the spermogone disappears; it is not so with the Lichens; it is necessary to choose some spermogones of the year, in a good state, and containing some mature spermatia.

This want of success is the more to be regretted as the theory of the spermatia, considered as a fecundatory agent comes to be sheltered from question among the Lichens by a recent work. M. le Dr. Stahl, a pupil of M. de Bary, is said to have found among the Lichens a trichogyne more or less allied to that of the Florideas, upon which the spermatia fix themselves, and affirms that it emits a small prolongment. Without discussing deeply the observations of M. Stahl, one can judge that the existence of a filament analogous to the copulative female filament (macrocyte), the base of which is the *point de départ* of the thecigerous filaments is not only in question. Under this head M. Stahl has proved himself a well-qualified anatomist. I will deny no more that the extremity of this filament does not come out to the exterior; but what appears singular in the actual state of our knowledge, it is that there is among the Lichens a fecundation of quite a different order to that in the other Ascomycetes. The Lichens are nothing else than some Fungi parasitic upon some seaweeds; the fact is established beyond all doubt, since the beautiful works of MM. Schwendener, Rees, and Bornet; certain species resemble some *Hysterium* (*Opegrapha*), the others some *Tympanis*, some *Cenangium*, and some *Pezizas*. Now in the Ascomycetes it appears probable, since the works published upon this subject by MM. de Bary, Woronin, Tulasne, Gillkinet, and, after my own observations, that there is unity of type in the mode of fecundation. The Lichens, are they excepted? Before deciding this point it is necessary to wait, as M. Stahl may have published some figures and descriptions, and that he may have plainly demonstrated

that the spermatia act just as the immovable antherozoids of the Florideas.

If it is really the case, the rôle of the fecundatory organs, such as we conceive them at the present time, according to the works of MM. de Bary, Woronin, and Tulasne, would be profoundly modified; the formation of the thecas would have consequently, may be from a conjugation, may be from the action of fecundatory bodies, as in the *Saprolegniae*, as I have shown, but it is necessary yet to obtain confirmation of these observations, which M. Stahl will, in all probability, make known to us.

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### PROFESSOR GUISEPPE DE NOTARIS.

Giuseppe De Notaris was born on the 5th of April, 1805, at Milan, of a noble but impoverished Italian family. He became a student of medicine in the University of Padua, where he obtained his degree in 1830, and practised for a short time in the hospitals at Milan. But his bent towards botanical studies had displayed itself even when a student, and in 1832 he received his first appointment as Assistant-Professor of Natural History to the Lyceum of St. Alexander in that city. After receiving several minor appointments, he was, in 1839, located at Genoa as Professor of Botany to the University; and in that town he resided for thirty-four years. During the whole of this time, while receiving honourable distinctions from almost every scientific society in Europe (culminating in the foreign membership of the Linnean Society of London in 1872), he obtained but little recognition from his own Government, and was in constant pecuniary straits which were perpetually interfering with the publication of his valuable botanical works. Indeed, at one time, but for the encouragement and assistance of a private friend, he would have abandoned a scientific career in despair. In 1867 he was offered, but declined, the chair of botany in the University of Turin; but in 1872 accepted the same post in the University of Rome. There he died on the 22nd of January of the present year, at the age of 72.

De Notaris's publications extend over almost every department of Botany; and it is only possible to refer to the most important, all of which belong to Cryptogamy. In Bryology, his first work (and the earliest of all his publications) was his "Synopsis Muscorum Mediolanensium," published in 1834. This was followed the next year by his "Pugillus Muscorum Italiæ novorum vel minus cognitorum," and, in 1837, by his "Specimen de Tortulis Italicis," a most important work in establishing the principles of bryological taxonomy. In 1838 he published his "Sylloge Muscorum Italiæ;" and in 1859 his great work "Musci Italici," which would long before have seen the light but for his want of means. His "Epilogo della Briologia Italiana," published to its immortal

honour, at the expense of the University of Genoa, received from the Academy of Sciences at Paris the great distinction of the Desmazières prize. His work may be said to have introduced a radical reform into the study of cryptogamy, as may be seen by comparing the first and second editions of Schimper's great work, "*Briologia Europæa*." De Notaris's bryological labours closed with his "*Musci Napoani*."

In Hepaticology we find his earliest work, "*Primitiæ Hepaticologicæ Italianæ*," containing descriptions of ninety-two species. In 1853 he published "*Appunti per un nuovo Censimento delle Epatiche Italiane*;" and very recently contributed to the "*Nuovo Giornale Botanico Italiano*," an account of Beccari's Hepaticæ from New Guinea.

In Mycetology, De Notaris published, in 1839, "*Micromicetes Italici novi vel minus cogniti*." Subsequently we find monographs of the Italian "*Excipulæ*," and "*Spheriaceæ*;" a revision of the "*Discomycetes*" and of the "*Pyrenomycetes*," besides numerous other lesser publications.

In Lichenology he was not idle. His "*Framenti Lichenografici*" first called the attention of botanists to the spores of lichens as furnishing characters for their classification. Other publications related to the *Parmeliaceæ*, to *Sticta*, to *Peltigera*, to *Abrothallus*, and to *Stereopeltis*.

In Algology his series of publications commences with his "*Algologiæ maris ligustici specimen*," containing descriptions of 125 species, many of them new. This was followed by his "*Nuovi Materiali per l'Algologia del mar Rosso*." In 1861 he published critical notes on the genera *Hormosiphon* and *Nostoc*, and in 1867 his "*Elementi per lo Studio della Desmidiaceæ Italiane*."

[Abstracted from a biographical notice—"Giuseppe de Notaris, sua vita e sue opere," in the "*Opinione*" of Rome.]

The following are the principal of Professor de Notaris's writings :—

Synopsis Muscorum Mediolanensium.

Musci Mediolanenses collecti et editi . . . . . 1834

Mantissa Muscorum ad Floram Pedemontanam . . . . . 1835

Pugillus Muscorum Italiæ novorum vel minus cognitorum.

Specimen de Tortulis Italicis.

Sylloge Muscorum Italiæ. . . . . 1838

Musci Italici . . . . . 1859

Cronaca della Briologia Italiana . . . . . 1864 1867

Epilogo della Briologia Italiana.

Musci Napoani, in Acad. Sci., Turin.

Primitiæ Hepaticologicæ Italianæ . . . . . 1830

Appunti per un nuovo censimento della Epatiche Italiane . . . . . 1853

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| Scapanie e Jubulee Italiche . . . . .                        | 1863 |
| Jungermannianarum Americanarum . . . . .                     | 1854 |
| Della Sarcoscyphus in Comm. Critt. Ital. . . . .             | 1861 |
| Epatiche raccolte Beccari.                                   |      |
| Micromicetes Italici Nuovi . . . . .                         | 1839 |
| Sulla tribu dei Pyrenonriceti.                               |      |
| Monografia delle Excipule.                                   |      |
| Prime linea Pirenomiceti isterinei.                          |      |
| Schema di Classificazione d Sferiacei Italici                |      |
| Proposte di alcune rettificazioni dei Discomiceti.           |      |
| Frammenti Micologici.  |      |
| Nuove reclute për la Pirenomicetologia Italica.              |      |
| Sferiacei Italici.   |      |
| Frammenti Lichenografica.                                    |      |
| Nuovi caratteri di alcuni generi della tribu d. Parmeliaceæ. |      |
| Osservazioni sul genera e Sticta . . . . .                   | 1850 |
| Osservazioni sulle tribu delle Peltigere . . . . .           | 1850 |
| Abrothallus novum lichenum genus . . . . .                   | 1845 |
| Sulla Stereopeltis . . . . .                                 | 1861 |
| Caratteri dell Opegrapha poetarum . . . . .                  | 1861 |
| Historia Fucorum maris ligustici.                            |      |
| Algologiæ maris ligustici specimen.                          |      |
| Nuovi materiali per l'Algologia del Mar Rosso.               |      |
| Hormosiphon e Nostoc . . . . .                               | 1861 |
| Elementi per lo studio della Desmidiacee Italiche . . . . .  | 1867 |
| Florula Caprarie . . . . .                                   | 1839 |
| Repertorium floræ ligusticæ . . . . .                        | 1843 |
| Isias novum Orchidearum genus.                               |      |
| Agrostographiæ ægyptiacæ fragmenta.                          |      |

## ORANGE MOULD ON FOREST TREES.

The following communication was read by M. C. Cooke at a recent meeting of the Scientific Committee of the Royal Horticultural Society :—

“Specimens of diseased leaves received from Mysore were accompanied by the following note :—

“ ‘ I very much regret to report that this pest has reappeared on all the estates, denuding the trees of all the fresh leaves they were getting, and leaving them bare sticks. It is very bad in Goomen-khan, and worse in some parts of the estates than in others. In some parts the leaves are thickly covered with the yellow dust, in others the leaves get speckled with brown spots, and fall off prematurely. This season the disease is also affecting the leaves of forest trees. I am sending you a few pressed Coffee leaves, some

with the yellow dust, and some with only the brown specks, and also the affected leaves of some large forest trees which have the rust or yellow dust upon them. If this pest is to go on affecting Coffee trees year after year, we shall never get an average crop from our trees; it is becoming a very serious matter to those interested in coffee.

"It need hardly be said that the Coffee-leaves with the yellow dust were affected by the too well-known *Hemileia*, and that the leaves were thoroughly covered with this pest. As to the same fungus having extended itself to the forest trees, some observations are necessary. Before entering upon the details, it may be fittingly remarked that the plan adopted in this instance of sending the leaves with the information is one of considerable importance. The statement that the Coffee disease was extending to forest trees is just the sort of statement which would be greedily accepted, and no amount of description by unskilled or unpractised botanists would have sufficed to arouse any suspicion that the parasite of the forest trees was quite a different species.

"The fungus on forest leaves very much resembles that of the Coffee-leaf, it occurs also on the under surface in roundish or confluent patches, is of the same orange colour, and certainly so closely resembles it externally that a mycologist might be deceived without microscopical investigation. There are, however, in the orange patches two kinds of bodies found mixed together, instead of one as in the *Hemileia*, one of these colourless, with a warted surface, the other smaller, smooth, and orange. It was some time before the structure could be clearly determined, and what the relation of the coloured to the uncoloured bodies. After many failures and some hours' examination, I believe that I have succeeded in determining the structure, and submitted my results to the Rev. M. J. Berkeley, who coincides in the opinion that the structure is correctly determined. The slender attachment of the spores in all moulds, especially when quite mature, render the structure difficult to ascertain. It is only by persistent effort that the spores can at length be discovered *in situ*. The present is no exception, but I think that the following details represents the fungus in question. The under-surfaces of the leaves present the mould in small orbicular, sometimes confluent, bright orange patches, from 1 line to one-third of an inch in diameter. These patches are composed of small tufts of short thick uncoloured sporophores, with a globose, unicellular head, studded on the surface with papillæ; the stem consists of from two to three, rarely four or five cells, a portion remaining attached to the globose head when that is detached. The entire length of this sporophore is about  $\cdot 05$ - $\cdot 06$  mm., and the diameter of the globose capitulum  $\cdot 03$  mm. Mixed with these sporophores are globose, smooth spores, containing a bright orange plasma, and about  $\cdot 0125$  mm. in diameter. These spores appear to be generated on the papillæ which surround

the capitulum, but hitherto I have not detected any apiculus to the spores, although I have seen them clustered around the capitulum. This structure appears to be so closely that which characterises the genus *Ædocephalum* that I doubt the propriety, at any rate for the present, of instituting a new genus for its reception, hence I have applied the name of *Ædocephalum aurantiacum*, with the subjoined diagnosis."

**Ædocephalum aurantiacum.** *Cooke.*—Cæspitulis orbicularibus, aurantiacis; floccis brevissimis, fasciculatis, septatis, hyalinis, supra globosis, papillatis; sporis ex capitulis exeuntibus; sporis globosis, aurantiacis, lævibus.

On leaves of forest trees. Mysore, India (December, 1876).

On the same leaves as the *Ædocephalum*, the following species of *Diplodia* occurred:—

**Diplodia Phyllostictæ.** *Cooke.*—Macula pallida, brunneo cincta. Peritheciis semi-immersis, atris, gregariis; sporis ellipticis, uniseptatis, parvulis.

On leaves of forest trees. Mysore.

Spores  $0.16 \times 0.08$  mm., but slightly coloured brown.

On the same leaves with the orange mould, *Ædocephalum aurantiacum*, C., but in no way related to it.

## ADDITIONS TO THE LICHEN FLORA OF NEW ZEALAND AND THE CHATHAM ISLANDS.

Dr. Stirton has enumerated and described the following Lichens in a paper read before the Philosophical Society of Glasgow, January 26, 1877:—

### CHATHAM ISLANDS.

*Calycidium cuneatum*, gen. nov.

*Pannaria thysanota*, sp. nov.

### NEW ZEALAND.

*Stereocaulon Buchanani*, sp. nov.

*Ricasolia asperula*, sp. nov.

*Parmelia pertransita*, sp. nov.

*Psoroma contextum*, sp. nov.

*Psoroma caliginosum*, sp. nov.

*Lecanora rubrocincta*, sp. nov.

*Lecanora subundulata*, sp. nov.

*Pertusaria dinota*, sp. nov.

*Pertusaria ceuthocarpa* (Sm.) \* *crenulata*.

\* *versicolor*.

" " *Pertusaria creberrima*, sp. nov.

*Pertusaria sórodes*, sp. nov.

*Pertusaria ascripta*, sp. nov.

- Cænogonium interplexum* (Nyl.) \* *contextum*.  
*Lecidea electrodes*, sp. nov.  
*Lecidea pineti* (Ach.)  
*Lecidea cyanopis*, sp. nov.  
*Lecidea corroborans*, sp. nov.  
*Lecidea hypopelidna*, sp. nov.  
*Lecidea phyllophila*, sp. nov.  
*Lecidea luteola* (Ach.)  
*Lecidea permutata*, sp. nov.  
*Lecidea perluta*, sp. nov.  
*Graphis scaphella* (Ach.)  
*Graphis enteroleuca* (Ach.)  
*Platygrapha atrata*, sp. nov.  
*Platygrapha gelatinosa*, sp. nov.  
*Platygrapha subgelatinosa*, sp. nov.  
*Arthonia diaphora*, sp. nov.  
*Arthonia perparvula*, sp. nov.  
*Verrucaria inflata*, sp. nov.  
*Verrucaria retrospiciens*, sp. nov.  
*Verrucaria epiphylla* (Fee).  
*Verrucaria leptalea*, sp. nov.  
*Verrucaria chrysophora*, sp. nov.  
*Verrucaria cinereo-nigrescens*, sp. nov.  
*Verrucaria retifera*, sp. nov.  
*Verrucaria crassescens*, sp. nov.  
*Verrucaria fossularia*, sp. nov.  
*Verrucaria cramba*, sp. nov.  
*Verrucaria lampocarpa*, sp. nov.  
*Trypethelium pulcherrimum* (Fee).  
*Psoromidium Wellingtonii*, gen. nov.  
*Lecanora cyamidia*, sp. nov.  
*Saginidium molle*, gen. nov.  
*Lecidea hypomelina*, sp. nov.  
*Arthonia cinerascens* (Krpr.) \* *crustosa*.

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## FUNGUS FORAY OF THE WOOLHOPE CLUB.

The annual Fungus Foray of the Woolhope Club is fixed to take place at Hereford, on the 4th of October next, when it is hoped that a strong party will muster.

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## DISTRIBUTION OF LICHENS IN TROPICAL AMERICA.

Dr. Adrian de Krempelhuber, of Munich, has, throughout the volume of the Regensburg Flora for 1876, described a magnificent collection of Lichens amassed by Dom. A. Glaziou, Director of the Public Gardens of Rio de Janeiro, from the maritime shores, lofty mountains (2330-2714 ft.), and woods of the province of Rio Janeiro. The collection numbers 350 species, of which 110 species are new, and belong to the genera—Phylliscum, 1; Heterina, 1; Trachylia, 1; Bæomyces, 1; Sticta, 1; Lecanora, 9; Urceolaria, 1; Pertusaria, 5; Phlyctis, 2; Thelotrema, 10; Ascidium, 2; Cœnogonium, 3; Lecidea, 19; Graphis, 33; Platygrapha, 1; Opegrapha, 4; Arthonia, 4; Chiodecton, 2; Verrucaria, 7; Trypethelium, 1; Astrothelium, 1.

The following tabular conspectus, compiled from various sources, enables us to obtain a very fair approximation of the distribution of Lichens over the various provinces of the northern or tropical region of South America:—

|                     | Rio<br>Janeiro<br>(Glaziou) | Lich.<br>Amaz. et<br>Andinii<br>(spruce.) | Guyana. | Nova<br>Granada. | Chili. | Peruv.<br>Boliv. |
|---------------------|-----------------------------|---|---------|------------------|--------|------------------|
| Lichinei .....      | 0                           | 0   | 1       | 0                | 0      | 0                |
| Collemei .....      | 10                          | 14  | 5       | 13               | 12     | 12               |
| Myriangei .....     | 0                           | 0   | 0       | 1                | 1      | 0                |
| Calicieï .....      | 1                           | 0   | 0       | 2                | 1      | 1                |
| Tylophorei .....    | 0                           | 0   | 0       | 2                | 0      | 0                |
| Sphærophorei.....   | 2                           | 0   | 0       | 1                | 4      | 0                |
| Bæomycei .....      | 2                           | 0   | 0       | 4                | 2      | 2                |
| Cladonieï .....     | 11                          | 15  | 2       | 8                | 16     | 11               |
| Stereocauliei ..... | 2                           | 4   | 0       | 6                | 3      | 7                |
| Roccellei.....      | 0                           | 0   | 0       | 0                | 4      | 3                |
| Siphulei .....      | 0                           | 0   | 0       | 2                | 2      | 3                |
| Usneei.....         | 3                           | 6   | 0       | 5                | 4      | 3                |
| Ramalinei .....     | 10                          | 3   | 2       | 3                | 14     | 12               |
| Cetrariei.....      | 0                           | 0   | 0       | 1                | 3      | 1                |
| Peltigerei .....    | 2                           | 2   | 0       | 4                | 6      | 4                |
| Parmeliei .....     | 36                          | 59  | 8       | 42               | 38     | 47               |
| Gyrophorei.....     | 0                           | 0   | 0       | 0                | 2      | 9                |
| Pyxinei .....       | 1                           | 3   | 1       | 2                | 1      | 1                |
| Lecanorei .....     | 76                          | 29  | 27      | 69               | 47     | 57               |
| Lecidiei .....      | 45                          | 22  | 25      | 41               | 33     | 46               |
| Graphidei .....     | 112                         | 48  | 60      | 100              | 23     | 61               |
| Pyrenocarpei.....   | 37                          | 40  | 58      | 43               | 101    | 26               |
| Total .....         | 350                         | 245                                       | 189     | 349              | 317    | 306              |

It should be remembered that the above table affords only an approximation, because, with the exception of Dr. Glaziou's Collection, the others comprise scarcely any, if any, saxicolar lichens.

## NORTH AMERICAN FUNGI.

By M. C. COOKE.

The following is an enumeration of specimens from New York, Maine, and South Carolina, being portions of collections received from those States :—

**Schizophyllum commune.** *Fr.*

On bark. Portland, Maine (Fuller, 98).

**Favolus alutaceus.** *B. & Mont.*

On oak. Portland, Maine (Fuller, 63).

**Lenzites sepiaria.** *Fr.*

On fir. Portland, Maine (Fuller, 62).

**Polyporus lucidus.** *Fr.*

On stump. Portland, Maine (Fuller, 58).

**Polyporus hirsutus.** *Fr.*

On trunks. Portland, Maine (Fuller, 85).

**Polyporus radiatus.** *Fr.*

On oak. Portland, Maine (Fuller, 86).

**Polyporus versicolor.** *Fr.*

On oak. Portland, Maine (Fuller, 87).

No. 61 (Fuller) is a *Polyporus* before the pores are formed, and hence too immature for determination.

**Stereum hirsutum.** *Fr.*

On branches. Portland, Maine (Fuller, 105).

**Dacrymyces deliquescens.** *Duby.*

On wood. Portland, Maine (Fuller, 106).

**Geaster hygrometricus.** *Fr.*

On the ground. Portland, Maine (Fuller).

**Hemiarcyria leiocarpa.** *Cooke.*

Sporangia simple, obovate or pyriform, rarely almost globose, pallid, with a stem of the same colour, as long as the diameter of the sporangia; mass of spores and capillitium concolorous, or with a slight ochraceous tint; capillitium sparse, forming a loose net; tubes branched in a reticulate manner; spirals three, thin, prominent along the convex side of the tubes, mixed with a few short obtuse spines; spores globose, smooth, with a thin membrane, .0125-.014 mm.—*Cooke Brit. Myx.*, fig. 252, 255.

On vegetable debris. Portland, Maine (Bolles).

**Trichia scabra.** *Rost.* var. *aurea.*

On rotten wood. Portland, Maine.

**Trichia abrupta.** *Cooke. Britt. Myx.*, fig. 256.

On rotten wood. Portland, Maine.

**Comatricha typhina.** *Rost.*

On bark. Portland, Maine (Fuller, 94).

Apparently this species, but in such wretched condition as to be scarcely determinable.

**Septoria Rhododendri.** *C.*

Epiphylla. Maculis orbicularibus, pallidis, atro-purpureo cinctis; peritheciis punctiformibus, aggregatis vel circinatis; sporis filiformibus.

On leaves of *Rhododendron*. Maine (Fuller, 75).

Spores filiform, .04 mm. long; perithecia clustered in the centre of orbicular pallid spots, with a dark purple margin.

**Sphæropsis baculum.** *Ger.*

Peritheciis erumpentibus, subgregariis, obtusis, epidermide cinctis; sporis cylindraceutis, obtusis, hyalinis, in cirrhis ochraceis emergentibus.

On branches of *Catalpa*. New York (168).

Spores .02 × .004 mm., rod-shaped, oozing out in a pale ochraceous tendril; perithecia large and obtuse.

**Sphæropsis connatum.** *Ger.*

Peritheciis 2-4 connatis, erumpentibus, obtusis, apice perforatis; sporis ellipticis, brunneis.

On twigs and branches. New York (175).

Spores .022 × .009 mm.; the perithecia are large and obtuse, from two to four being confluent, and bursting through the cuticle, so as to resemble some species of *Valsa*.

**Excipula incurva.** *C.*

Sparsa, atra. Excipulis hemisphericis, nitidis, margine valde incurvo, disco livido-griseo, extus pilis rigidis, elongatis, densissimis obsitis; sporis cylindraceutis, curvulis, utrinque obtusis, hyalinis, 2-4 nucleatis.

On herbaceous stems. New York (Gerard, 170).

Distinguished by the strongly incurved margin, and the profuse rigid hairs; spores .018 mm. long.

**Coniothecium discoideum.** *C.*

Sparsum, discoideum, atrum; sporis ellipticis, vel oblongis, 1-3 septatis, cellulis transversaliter divis.

On decorticated sticks. New York (Gerard, 28).

Discoid, resembling a scattered black *Peziza*; spores oblong or elliptic, 1-3 septate, generally with one cell divided, bright translucent brown, .015-.02 × .008 mm., concatenate.

**Stilbospora monotospora.** *C.*

Subcorticalis, erumpens; soris orbicularibus; sporis obovatis, opacis, atrobrunneis.

On bark of *Magnolia glauca*. S. Carolina (Ravenel, 1671).

Spores just like those of some species of *Monotospora*, quite simple, dark brown, obovate, .022-.025 × .02 mm.

**Ræstelia cancellata.** *Tul.*

Spermogonia. Portland, Maine (Fuller, 99).

**Æcidium Grossulariæ.** *DC.*

On *Ribes*. Portland, Maine (Fuller, 79).

**Uredo Solidaginis.** *Schw.*

On *Solidago*. Portland, Maine (Fuller, 71).

**Trichobasis Junci.** *Str.*

On *Juncus*. Portland, Maine (Fuller, 72).

**Puccinia Lychnidearum.** *Link.*

Portland, Maine (Fuller, 84).

**Puccinia striola.** *Lk.*

On *Carex*. Portland, Maine (Fuller, 67, 68).

**Puccinia Asteris.** *Schw.*

On *Aster*. Portland, Maine (Fuller, 69).

**Puccinia Thalictri.** *Grev.*

On *Thalictrum*. Portland, Maine (Fuller, 70).

**Uromyces apiculosa.** *Lev.*

On Bean leaves. Portland, Maine (Fuller, 96).

**Uromyces Solidaginis.** *Niessl.*

Hypophylla. Soris sparsis, orbicularibus, atro-brunneis, epidermide cinctis; sporis subglobosis, late brunneis, reticulatis, breviter pedicellatis.

On *Solidago*. Portland, Maine (Fuller, 80).

Spores nearly globose, with a reticulated epispore,  $\cdot 02 \times \cdot 022$  mm. Sori of the *Uredo* often occur on the same leaf.

**Uromyces Asclepiades.** *C.*

Hypophylla. Sori minimis gregariis, atro-brunneis, epidermide cinctis; sporis pyriformibus, late brunneis, pedicellis hyalinis, brevis, tenuibus.

On leaves of *Asclepias*. Cape Elizabeth, Maine (Fuller, 66).

Spores pyriform, or obovate, with a slight hyaline point at the apex,  $\cdot 02 \times \cdot 03$  mm., with slender hyaline pedicels.

**Uromyces triquetra.** *C.*

On leaves of *Elodea*. Portland, Maine (Fuller, 83).

**Tubercularia vulgaris.** *Tode.*

On sticks. Portland, Maine (Fuller, 90).

**Epicoccum reticulatum.** *C.*

Gregarium, in maculis congestis, atro-brunneis; sporis magnis, reticulatis, subglobosis, brunneis.

On old paste board. New York.

Spores coarsely reticulated,  $\cdot 025\text{--}\cdot 03$  mm. diam. Allied to *E. effusum*, Fekl.

**Streptothrix fusca.** *Ca.*

On juniper, with *Peziza cedrina*. New York (Gerard).

**Polythrincium trifolii.** *Kze.*

On leaves of clover. Portland, Maine (Fuller, 95).

**Cladosporium epiphyllum.** *Nees.*

On oak leaves. Portland, Maine (Fuller, 101).

Rav., 2131, on follicle of *Asclepias*, is one of the black moulds, probably *Sporocybe byssoides*, as there is a capitate head to the flocci, and a few free globose spores.

**Cercospora ferruginea.** *Fekl.*

On leaves of *Erigeron tomentosum*. S. Carolina (Rav., 2108.)

Apparently not distinct from the typical form.

**Peziza retiderma.** *Cooke in Mycographia, fig. 306.*

On the ground. Portland, Maine (Fuller, 64).

**Ascobolus (Ryparobius) brunneus.** *Boud. Ann. Sci. Nat.*  
On dog's dung. New York (Gerard, 177).

**Lophodermium pinastri.** *Schrad.*  
On fir leaves. Portland, Maine (Fuller, 100).

**Lophodermium juniperinum.** *Not.*  
On juniper leaves. Portland, Maine (Fuller, 107).

**Xylaria polymorpha.** *Fr.*  
At root of maple. Portland, Maine (Fuller, 59).

**Valsa ceratophora.** *Tul.*  
On bark. New York (Gerard, 164).

**Valsa stellulata.** *Fr.*  
On branches. New York (Gerard, 167).

**Valsa tetraploa.** *B. & C.*  
On branches. New York (Gerard, 180).  
Only containing stylospores.

**Sphæria (caulicolæ) eriophora.** *C.*  
Gregaria. Peritheciis globosis-depressis, atris, hispidis, demum prope glabris, primo tectis, dein epidermide delapsis, nudis, matrice nigrofacticis; ascis cylindraceutis; sporidiis late lanceolatis, 1-3 septatis, constrictis, fuscis.

Apparently on stems of *Lappa*. New York (Gerard, 166).

Perithecia at first covered, soon exposed by the falling away of the cuticle, woolly, then becoming smooth, seated on the blackened stem; sporidia obtusely lanceolate, at first uniseptate, then tri-septate, constricted at the septa, pale brown,  $0.025 \times 0.01$  mm.

**Sphæria Coryli.** *Batsch.*  
On leaves of *Corylus*. Portland, Maine (Fuller, 82).

**Sphærella Panicum.** *C.*  
Sparsa, epiphylla. Peritheciis tectis, in maculas purpureis; ascis clavatis; sporidiis biseriatis, fusiformibus, hyalinis, triseptatis.

On fading leaves of *Panicum*. S. Carolina (Rav. 2111 c.).

Perithecia sometimes singly and sometimes two or three together, seated on purplish spots; sporidia  $0.025 \times 0.005$  mm.

**Ceratostoma verniceum.** *Desm.*  
On very rotten wood. Portland, Maine (E. C. B.).  
Barren, but agreeing externally with this curious species.

**Stigmatea sclerotidea.** *Cooke.*  
Gregaria, atra. Peritheciis superficialibus, depressis; ascis clavatis; sporidiis biseriatis, ellipticis, hyalinis, uniseptatis.

On leaves of *Arundinaria*. S. Carolina (Rav., 1476).

Externally resembling a small sclerotium; asci very soon dissolved; sporidia  $0.022 \times 0.009$  mm.

The following cannot be named:—

No. 162 (Ger.), probably the remains of some old minute *Sphæria*, without any trace of spores.

No. 163, *Sclerotium* on *Asclepias*.

No. 126 (Ger.), apparently a minute *Septoria*, on dead leaves, but without any fruit.

From Portland, Maine, the following are insect productions :— Fuller, Nos. 97, 103.

No. 108 (Fuller) is an incipient barren *Septoria*.

### ERISIPHE GRAMINIS. DC.

On April 5th Dr. H. W. Harkness read a paper before the San Francisco Microscopical Society, on the subject of a species of *Erisiphe*, which appeared on wheat in California; though allied to *Erisiphe graminis*, DC., he thought it would prove to be a distinct species. Dr. Harkness kindly forwarded a specimen to us for comparison, and having done so, we arrive at the conclusion that it is in no way distinct from the European species. It must, however, be added that the spores were immature, and hence the examination was not wholly complete.

There is one point of interest in Dr. Harkness' communication to which we desire attention. It is the announcement that he has found the pycnidia, which apparently were unknown to Tulasne, and which Fuckel afterwards sought for in vain. He says—

“Growing out of the mycelium projections are seen, from which conidia are produced. These appear as upright moniliform threads, bearing three or more oval spores. These, when placed in water, throw off germinal tubes. On boiling a portion of the fungus in a solution of caustic potash, the mycelium is destroyed, and a clearer view of the reproductive bodies may be obtained.

“At the present stage of development, but one form of *Pycnidia* is observable, which is nearly globular in shape, and of a dark-brown colour. From this abundant ovate *stylospores* are ejected. No other forms of pycnidia, such as Tulasne figures, are at present discernable. Large numbers of other bodies are seen, which prove to be conceptacles,” &c.

Although we were not successful in finding pycnidia upon the specimen we received, there is no reason to doubt the observations of Dr. Harkness. If confirmed it is an additional fact in the history of this common fungus.

### NEW BRITISH LICHENS.

The following most recent additions to the Lichen-Flora of Great Britain, &c., are described in Papers by Rev. W. A. Leighton, read before the Linnean Society :—

1. *Calicium Kylemoriense*, LARBAL. Connemara. (*Larbalestier*).
2. *Pertusaria incarnata*, LEIGHT. Connemara. (*Larbalestier*).
3. *Lecidea impressula*, LEIGHT. Pembrokeshire. (*Leighton*).

4. *Lecidea tephrizans*, LEIGHT. Pembrokeshire. (*Leighton*).
5. *Lecidea rysssolea*, LEIGHT. Pembrokeshire. (*Leighton*).
6. *Lecidea imponens*, LEIGHT. Pembrokeshire. (*Leighton*).
7. *Lecidea glaucomaria*, NYL. Pembrokeshire. (*Leighton*).
8. *Lecidea parellaria*, NYL. Pembrokeshire. (*Leighton*).
9. *Lecidea endomelæna*, LEIGHT. Trefriw, N. Wales. (*Leighton*).
10. *Lecidea grumosa*, LEIGHT. Connemara. (*Larbalestier*).
11. *Lecidea antrophila*, LARBAL. Connemara. (*Larbalestier*).
12. *Lecidea polospora*, LEIGHT. Connemara. (*Larbalestier*).
13. *Odontotrema majus*, LEIGHT. Pembrokeshire and Shropshire. (*Leighton*). Gloucestershire (*Joshua*).
14. *Lithographa Larbalestierii*, LEIGHT. Connemara. (*Larbalestier*).
15. *Verrucaria neottizans*, LEIGHT. Pembrokeshire. (*Leighton*).
16. *Verrucaria fumosaria*, LEIGHT. Pembrokeshire. (*Leighton*).
17. *Verrucaria pertenuis*, LEIGHT. Pembrokeshire. (*Leighton*).
18. *Verrucaria arenicola*, LEIGHT. Shelton Rough, near Shrewsbury. (*Leighton*).
19. *Verrucaria Larbalestierii*, LEIGHT. Connemara. (*Larbalestier*).
20. *Lecidea alocyzoides*, LEIGHT. Great Orme's Head; Llanynech; Eglswg Rocks.

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### MONOGRAPH OF USTILAGINES.\*

Professor Fischer de Waldheim has identified himself with this group of Fungi by his previous publications, so that a monograph from him is sure to be accepted with confidence and satisfaction. We have no doubt that this feeling will be strengthened by acquaintance with the work before us. Unfortunately too little time is devoted now-a-days by Mycologists in the preparation of careful monographs. It is but rarely that such works make their appearance, although so urgently required. The acquaintance which we have so recently made with the excellent monograph of the *Myxomycetes* by Dr. Rostafinski, and now with the smaller and less pretentious monograph of the *Ustilagineæ*, by Fischer de Waldheim, confirm us in the opinion that this is the most needful, and most satisfactory labour to which a competent Mycologist can direct his energies.

This Monograph contains an enumeration of all the species known to its author, arranged under seven genera, and to each species is attached a list of the plants on which it has been found. There are one hundred and twenty-seven species, besides a few doubtful forms at the end.

\* Aperçu systématique des Ustilaginées, par A. Fischer de Waldheim. Paris, 1877.

We can only give an outline of the contents of these fifty quarto pages, and recommend our readers to add the work to their library at once, as it will be found to be one of permanent interest, without which no student of the *Coniomyces* can long prosecute his studies.

The genus *Ustilago* contains seventy-two species, arranged as follows :—

- A.** Spores with the epispore smooth.
  - † Spores globose, rounded-oblong, or a very little flattened.
    - a. Epispore brown.
    - b. Epispore violet.
    - c. Epispore violet-grey.
  - †† Spores rounded or oblong, flattened.
    - a. Epispore blackish.
    - b. Epispore brown.
- B.** Spores with a granular epispore.
- C.** Spores with the epispore papillose.
  - a. Epispore brown.
  - b. Epispore violet.
- D.** Spores with the epispore spinulose.
- E.** Spores with the epispore warted.
- F.** Spores with the epispore reticulated.
  - a. Epispore brown.
  - b. Epispore violet.
  - c. Epispore reddish-violet.
  - d. Epispore colourless, or very pale.

The measurement of the spores in each species is given in micro-millimetres.

The second genus is *Sorosporium*, which includes the two British species of *Tubercinia*. It is only a small genus, of six species, and of these we presume that *Sorosporium Saponariæ*, Rud., is the type.

The next genus is *Thecaphora*, with its twelve species, calling for no special remark.

The fourth genus is *Urocystis*, under which is included *Tubercinia Orobanches*, Fr., and *Tubercinia Monotropæ*, Fr.

The fifth genus is *Geminella*, with four species, one of which is *Ustilago Cissi*, Tul., and another, *Thecaphora Delastrina*, Tul. The latter always appeared to us an anomalous *Thecaphora*.

The sixth genus is *Entyloma* (after De Bary in *Botanische Zeitung*, for 1874), only containing four species, one of which is stated to be equal to *Cylindrosporium Ficaræ*, Berk., of which we entertain some doubt.

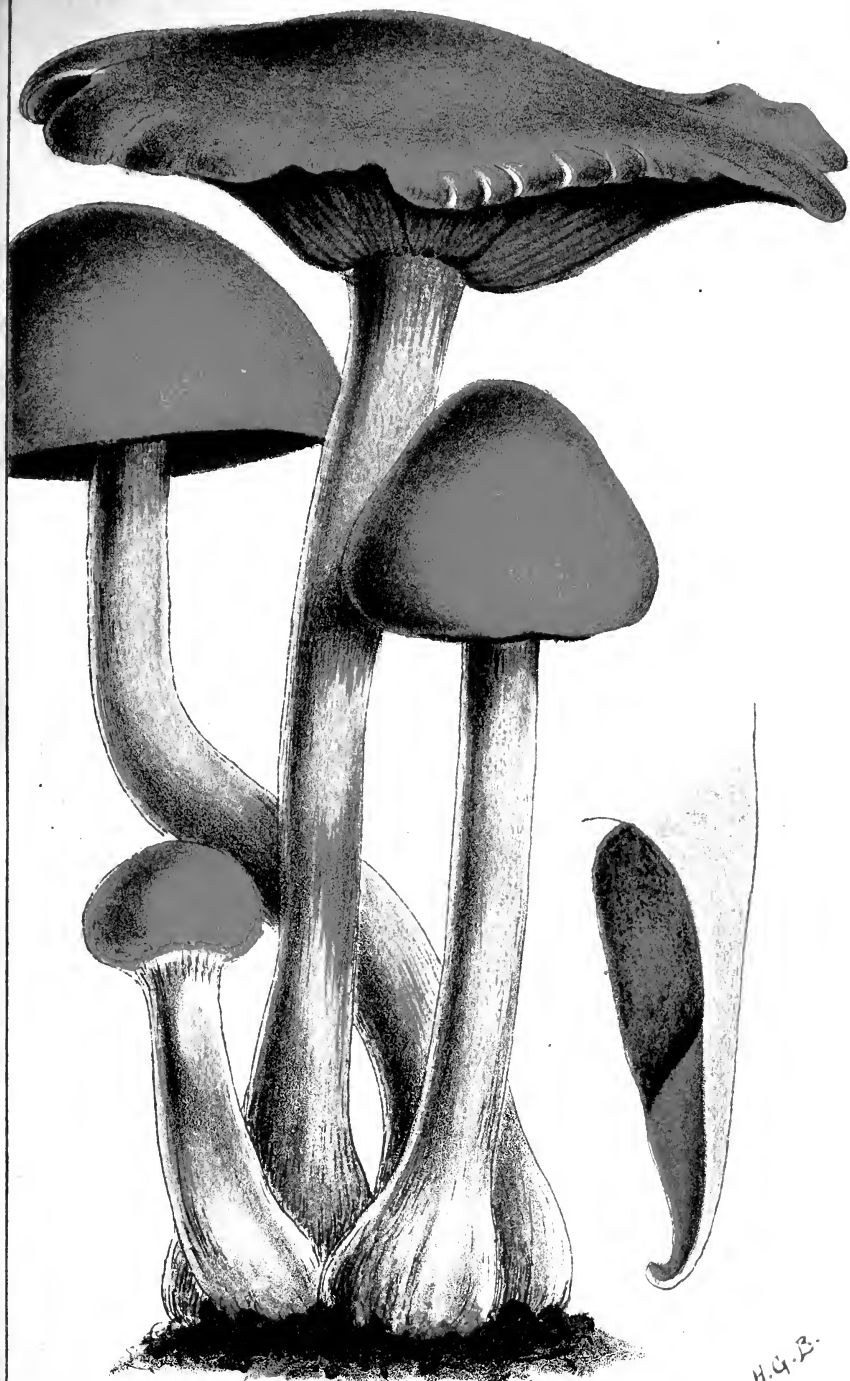
The last genus is *Tilletia*, with fourteen species. From this brief survey the character of the work can be estimated. Each genus has a full diagnosis at the commencement, and the only drawback is one which might easily have been remedied, namely, that in no case is the work cited in which any given species is





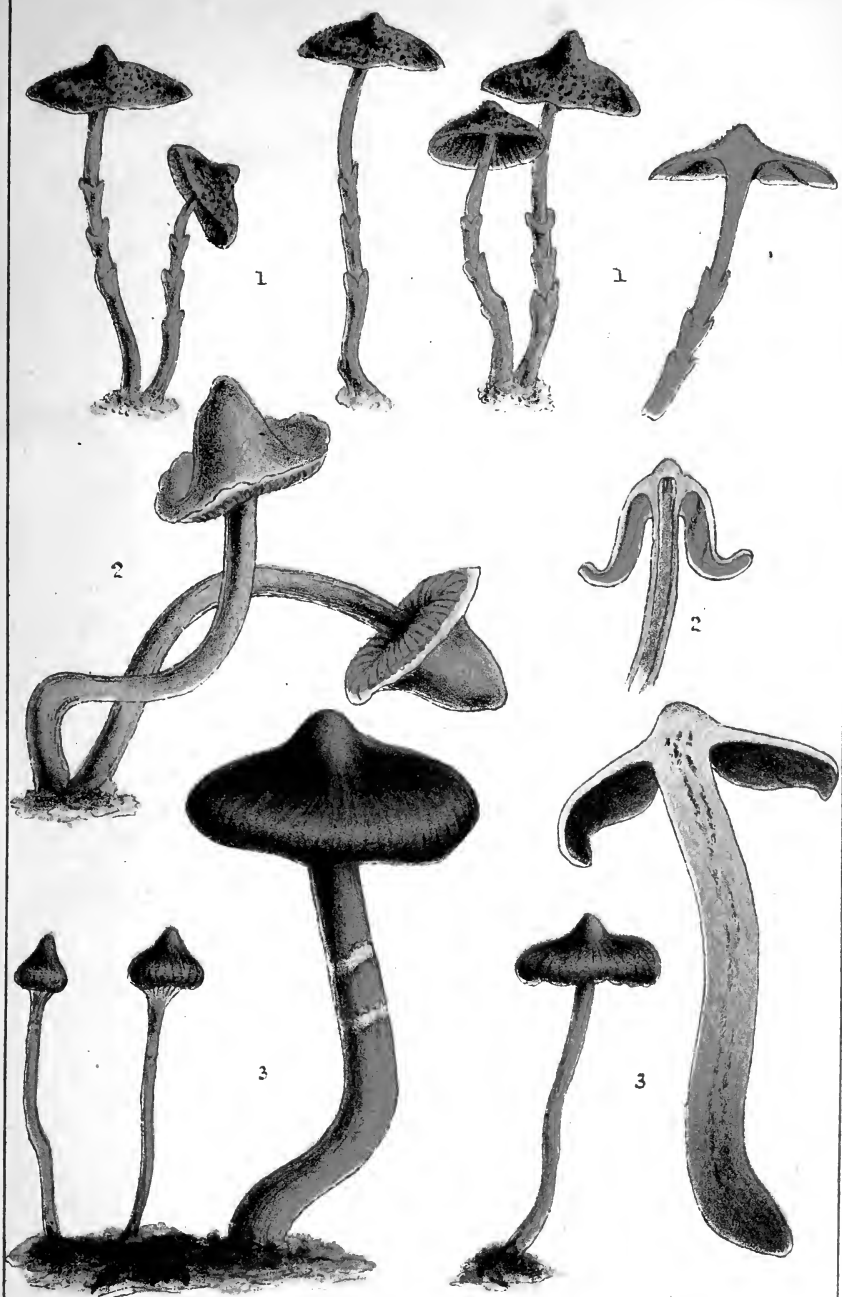
1 *Agaricus Cookei*. Fr. 2. *Hygrophorus clunensis*. Fr.  
 3. *Agaricus cirrhatus*. Sch





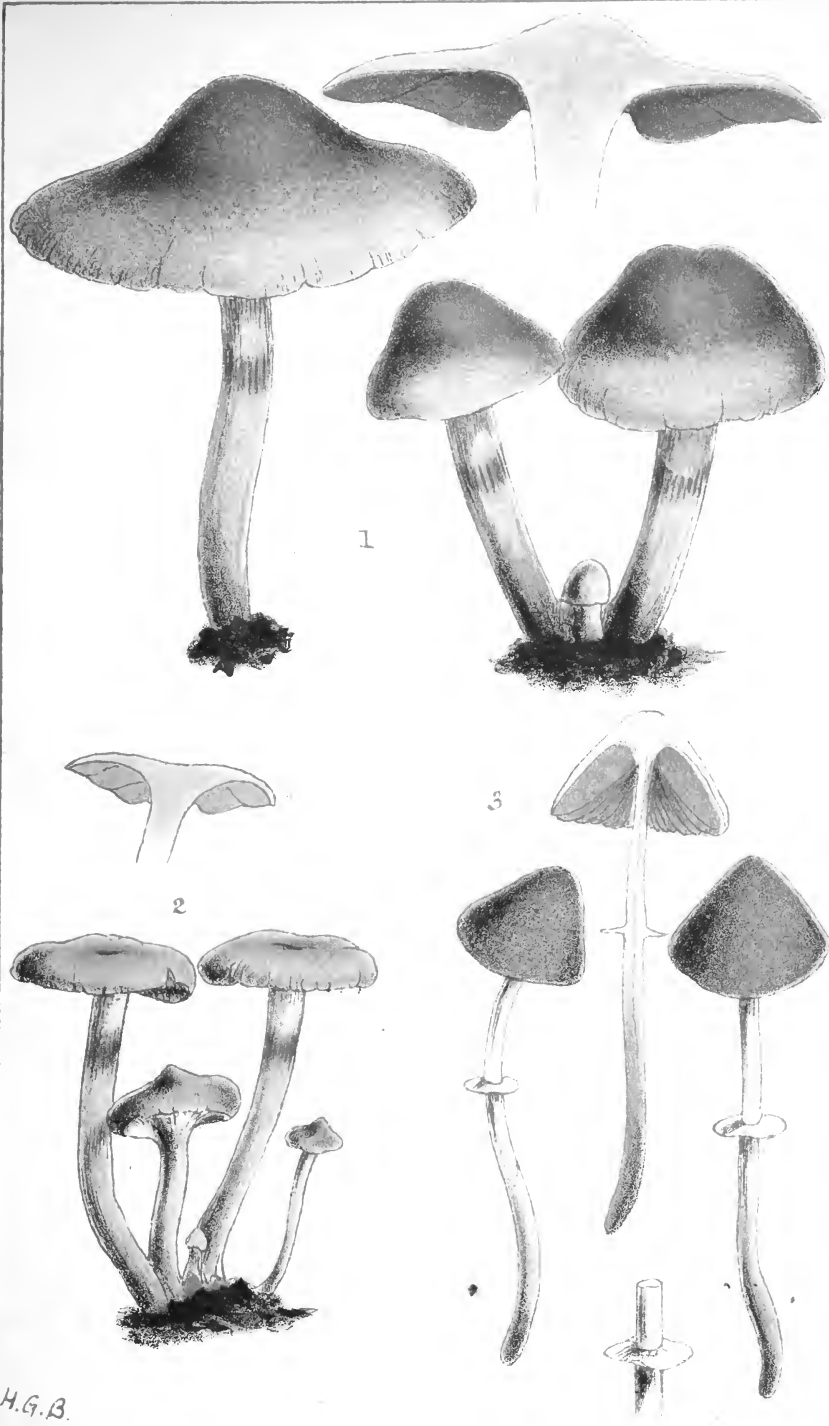
CORTINARIUS SEBAEUS. FR.





1. 2. *Cortinarius ocutus*. Fr. 3. *Cortinarius gentilis*. Fr.





1. *Cortinarius ochroleucus* Fr.  
 2. *Cortinarius dilutus* Fr. 3. *Agaricus togularius* Fr.





described, and only an occasional synonym is quoted without any references. We regret to be compelled to allude to what we regard as a great defect in the literary portion of the Monograph, otherwise we give it every commendation.

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## FIGURES OF AGARICS.

PLATES 83, 84, 85.

**Cortinarius sebaceus.** *Fr.*—(Pl. 83.) Figured from drawing by Dr. Bull, of specimens collected near Hereford.

**Cortinarius acutus.** *Fr.*—(Pl. 84.) The upper figures (fig. 1) are from drawings by Dr. Bull, of a variety of this species, with a scaly pileus, and peculiar stem. The middle figures (fig. 2) are those of another distinct form, found by Mr. W. Phillips, near Shrewsbury. At present these are both referred, but not without doubt, to the above species.

**Cortinarius gentilis.** *Fr.*—(Pl. 84, fig. 3.) The figures are from drawings by Dr. Bull, of specimens found in the neighbourhood of Hereford.

**Cortinarius ochroleucus.** *Fr.*—(Pl. 84, fig. 1.) Also figured from drawings by Dr. Bull. It is printed with rather too dark a tone of colour.

**Cortinarius dilutus.** *Fr.*—(Pl. 84, fig. 2.) A variety, according to Fries, to whom sketch was submitted, but diverging considerably from the typical form. From drawing originally made by Mr. Renny.

**Agaricus togularis.** *Fr.*—(Pl. 85, fig. 3.) This is the *Agaricus Arrhenii* of Fries, and *Agaricus mesodactylus* of Berk.) *Annals of Nat. Hist.*, No. 329), afterwards referred to *Agaricus mycenoides*, under which latter name it appears in the "Handbook," No. 306. In the last edition of the *Epicrisis* of Fries, it stands under *A. togularis*. Figured from specimens collected by Mr. C. B. Plowright.

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## ELVELLACEI BRITANNICI.

Mr. W. Phillips, of Shrewsbury, has just issued the third fasciculus of specimens illustrative of the *Discomycetes* of Great Britain. It contains some very rare and interesting species, and is of especial value, since the limitation enables him to secure critical accuracy for his specimens, which cannot always be secured when the whole range of fungi is included within the scheme of publication. The excellence of the collection, indicated in previous notices, continues to be maintained. Other fasciculi have been issued by Rehm, Thumen, Saccardo, &c., which are enumerated amongst Cryptogamic Literature.

## SPORE FORMATION IN UROCYSTIS.

Dr. Farlow, in his recent account of the "Onion Smut" of the United States, gives his experience of the formation of the spores in the supposed new species *Urocystis Cepulae*. He says that there first appears on the mycelium a small lateral swelling of the hypha, which divides by a partition at right angles to the length of the hypha into two cells, or else, as is not unfrequently the case, the two cells arise from the hypha simultaneously, and close to one another. Of the two cells which thus arise, one enlarges so as to become nearly spherical; whilst the other elongates into a worm-like body which bends over the surface of the other cell. In a short time the worm-like thread is divided into a number of cells by partitions at right angles to its length. The cells into which the worm-like body is thus divided, then bud out at the sides, and grow down in a winding manner so as to cover the original globular cell. By subsequent division of these winding cells the accessory spores are formed. This process in its initial stage reminds one of what takes place in *Podosphæra*. There is here, however, nothing like a conjugation, and the worm-like body can in no sense be considered a pollinidium. In *Urocystis Cepulae*, at any rate, the theory that the accessory spores are formed by the indefinite interlacing of the hyphae around the globular cell is not true. They arise from a single, definite, worm-like thread.

Professor Fischer de Waldheim describes the formation of the spores in *Urocystis* in conformity with the observations of MM. Winter and Wolff, which is not precisely the same. He says, "Les branches du mycele se transforment en filaments sporogènes; en se toadant en spirales et devenant gélatineuses; d'autres branches s'avancent vers les spirales, les entourent ou confluent avec elles, en devenant également gélatineuses et produisant des glomérules. Chaque glomérule est composé de spores (centrales ou vraies), et de cellules périphériques. Les branches en spirales produisent les spores; les autres, à l'entour,—les cellules périphériques."

## MYCOGRAPHIA.

The publication of the 4th part has been unexpectedly and unavoidably delayed for some time beyond the period when it should have appeared. It is now in the binder's hands, and will be issued simultaneously with the present number of this Journal. As on previous occasions, it contains twenty coloured plates, with the descriptive letter-press, illustrating the *Cupulares* section of the genus *Peziza*. The following part it is proposed to issue in the autumn, and will contain the remainder of the pileate species, such as *Morchella*, *Gyromitra*, *Helvella*, *Spathularia*, &c.

## THE MYXOMYCETES.

It is half a century since the arrangement of these fungi by Fries in his "Systema," and from that time nearly to the present this system prevailed. Occasional genera were added, and a few hints given of internal structure, but as a whole the basis of classification was external absolutely, or concerned those features only which could be distinguished by a pocket lens. At first Prof. de Bary made some suggestions as to the rectification of the classification, but unfortunately at that time it was his opinion that these organisms should be excluded from Fungi, and allied with the Rhizopods. This latter view, however, is now no longer maintained, and it is to a former pupil of Dr. de Bary that we are indebted for a new arrangement of Myxomycetes, or, as he continues to call them, the Mycetozoa, on new principles.

Dr. Joseph Rostafinski has issued, in a quarto volume, fully illustrated, a complete and elaborate Monograph, with two great hindrances attached to it, firstly, that it is in the Polish language, and secondly, that the book is very difficult to obtain. In view of these hindrances, a translation into English has been undertaken, and will be published in a few days, of as much as relates to British species, with reproductions of the figures, and characters of all the genera whether British or not.

Since the publication of this Monograph, a Supplement has been issued, embodying the results of Dr. Rostafinski's tour to Western Europe, and his examination of herbaria in Germany, France, and England. Several alterations suggested by this experience have been made, and the following arrangement of the orders, families, and genera, finally proposed.

SUB-DIVISION I. **AMAUROSPORÆ.**Sect. A. *ATRICHÆ.*

## ORDER I. PROTODERMEÆ.

*Family* 1. PROTODERMACEÆ.Genus 1. *Protoderma.*Sect. B. *TRICHOPHORÆ.*

## ORDER II. CALCAREÆ.

*Family* 2. CIENKOWSKIACEÆ.Genus 2. *Cienkowskia.**Family* 3. PHYSARACEÆ.Genus 3. *Badhamia.*,, 4. *Physarum.*,, 5. *Fuligo.*,, 6. *Craterium.*,, 7. *Leocarpus.*,, 8. *Crateriachea.*,, 9. *Tilmadoche.*

*Family 4. DIDYMIACEÆ.*Genus 10. *Chondrioderma*.„ 11. *Didymium*.„ 12. *Lepidoderma*.*Family 5. SPUMARIACEÆ.*Genus 13. *Diachea*.„ 14. *Spumaria*.

## ORDER III. AMAUROCHÆTEÆ.

*Family 6. ECHINOSTELIACEÆ.*Genus 15. *Echinostelium*.*Family 7. STEMONITACEÆ.*Genus 16. *Lamproderma*.„ 17. *Comatricha*.„ 18. *Stemonitis*.*Family 8. AMAUROCHÆTACEÆ.*Genus 19. *Amaurochæte*.*Family 9. BREFELDIACEÆ.*Genus 20. *Brefeldia*.*Family 10. ENERTHEMACEÆ.*Genus 21. *Enerthenema*.SUB-DIVISION II. **LAMPROSPORÆ.**Sect. A. *ATRICHÆ.*

## ORDER IV. ANEMEÆ.

*Family 11. DICTYOSTELIACEÆ.*Genus 22. *Dictyostelium*.*Family 12. LICEACEÆ.*Genus 23. *Licea*.„ 24. *Tubulina*.„ 25. *Lindbladia*.*Family 13. CLATHROPTYCHIACEÆ.*Genus 26. *Clathroptychium*.„ 27. *Enteridium*.

## ORDER V. HETERODERMEÆ.

*Family 14. CRIBRARIACEÆ.*Genus 28. *Dictydium*.„ 29. *Heterodictyon*.„ 30. *Cribraria*.Sect. B. *TRICHOPHORÆ.*

## ORDER VI. COLUMELLIFERÆ.

*Family 15. RETICULARIACEÆ.*Genus 31. *Siphoptychium*.\*„ 32. *Reticularia*.

## ORDER VII. CALONEMEÆ.

*Family* 16. PERICHÆNACEÆ.Genus 33. *Perichæna*.*Family* 17. ARCYRIACEÆ.Genus 34. *Cornuvia*.,, 35. *Arcyria*.,, 36. *Lachnobolus*.,, 37. *Dermodium*.,, 38. *Lycogala*.,, 39. *Oligonema*.*Family* 18. TRICHIACEÆ.Genus 40. *Prototrichia*.,, 41. *Trichia*.,, 42. *Hemiarcyria*.

It will be seen that the proposed arrangement differs considerably from the older one, but we are unable to detail the orders and genera here, without which the method cannot be understood. Suffice it to say that external features are but slightly regarded, and that structural differences and details take precedence. Two primary divisions are based on the colour of the spores, subsidiary to these the presence or absence of a capillitium constitute in each a subdivision. The position of honour is undoubtedly assigned to the columella and capillitium, or whatever occupies their place. The character of the capillitium, when present, its mode of attachment, method of ramification, external markings, thickness, and combinations, all bear some relation to the classification, so that we have, to a large extent, a system based on the capillitium, an internal structure which can only be determined by the use of the microscope. The presence or absence of lime is an accessory feature. We have, in the new arrangement, perhaps, manifested the usual tendency to rebound from one extreme to the other; from a total disregard of microscopical structure, to an entire ignoring of external features. This is a fault which will ultimately correct itself, as experience may dictate. We would venture to think that some modifications in this direction will be inevitable; nevertheless, as far as we can judge, there is a completeness and unity in the system, a soundness in the principles which lie at the foundation, and, notwithstanding any minor faults, that it is a thorough reform of the *Myxomycetes*, for which mycologists will have reason to respect and honour its indefatigable young author. With the prospect of a long career before him, it may be hoped, and anticipated, that he will do similar good work in other directions, for this is by no means the only group in which a thorough reformation was needed. One desire will be shared by many that the next Monograph may not be written in Polish by an author equally competent to produce it either in Latin or French.

Apropos of this subject we have just received the first portion of an arrangement of Myxomycetes by Professor F. Hazslinszky, chiefly in respect to the Hungarian species. Unfortunately this is published in Hungarian, even as Rostafinski's was in Polish, and this places a difficulty in the way of our giving an immediate analysis. It is nevertheless evident that a modification of the old system is adopted rather than the recent one, as will be seen by the following enumeration of the genera contained in the portion of the work which is issued:—

1. Ceratiaceæ.
  1. Ceratium, *A. & S.*
2. Lycogaleæ.
  2. Lycogala, *Mich.*
  3. Reticularia, *Fr.*
  4. Æthaliium, *Link.*
  5. Spumaria, *Pers.*
3. Ophirideæ.
  6. Ophiridium, *Hazs.*
4. Cribrariaceæ.
  7. Cribraria, *Schr.*
  8. Dictydium, *Schr.*
5. Stemonitideæ.
  9. Diachæa, *Fr.*
  10. Stemonitis, *Gled.*

Some time since we received from Professor Hazslinszky a small portion of a specimen of the Myxogaster, which he has since described as *Ophiridium dissiliens*, and which is the type of his genus *Ophiridium*, and also of the family *Ophirideæ*. From a careful examination and comparison we do not hesitate to pronounce it a species of *Clathroptychium*, very nearly allied to, even if not identical with *Clathroptychium rugulosum*, Rost. The curious bodies which seemed to the author to be secondary internal sacs, he will discover to be the upper, dome-like portion of the sporangia, from which proceed the six undulated triangular threads attached to them, downwards to the base of the compound sporangia or æthaliium. The structure is so precisely that of *Clathroptychium* that it would at once be recognised by any one acquainted with that genus, the peculiarities of which were first clearly indicated by Rostafinski.

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## THE LINDSAY COLLECTION OF LICHENS.

Dr. Lauder Lindsay, of Perth, has lately offered his Herbarium of Lichens, Manuscripts, Drawings, and Books to the Botanic Gardens at Edinburgh, on condition that a small room was provided for their reception. Unfortunately there is so great a lack of accommodation so urgently needed for class work and for other purposes, that there is no probability of the offer being accepted. This is much to be regretted, and we would fain hope that attention being now drawn to the necessities of the Gardens, some steps may be taken to remedy a portion of the deficiencies under which Professor Balfour has been compelled to labour. The Edinburgh Gardens are just the place where Dr. Lindsay's Collection should have been located, and the Scotch Botanists especially will regret that circumstances prevented Dr. Lindsay's kind offer being accepted.

## GREVILLEA, PAST AND FUTURE.

The present number of GREVILLEA completes its fifth year, and enables us to direct attention to the effort which has already been made, at the suggestion of numerous subscribers, to publish coloured figures of Agarics, especially of the genus *Cortinarius*. Those which have appeared may be accepted as an earnest of even better work in this direction in the sixth volume. Already four additional plates have been prepared, and it is to be hoped that an accession to the number of subscribers will afford some encouragement to proceed. No one regrets more than we do ourselves that Bryologists have so little to communicate to our readers. If the offer of a fair field and all necessary illustrations fails to tempt them, we fear that we have no additional inducements to offer.



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